# AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.

Volume 66 Number 14



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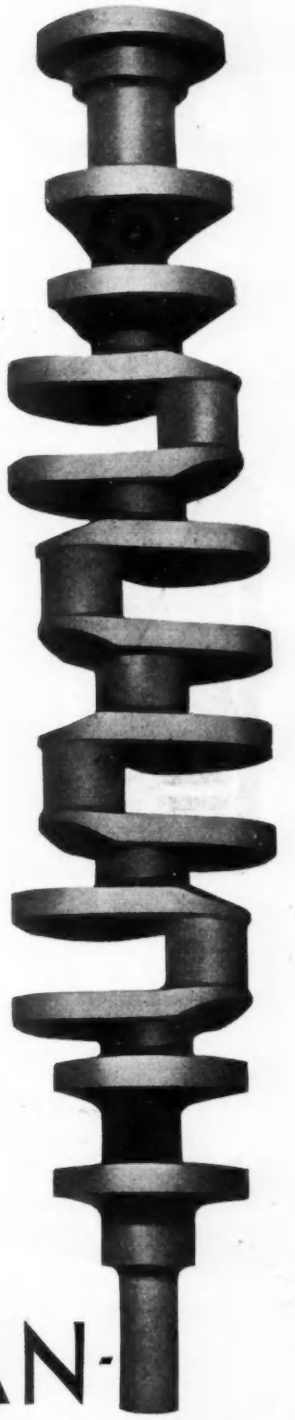


FOREMOST
IN
SCIENTIFIC
DEVELOPMENT

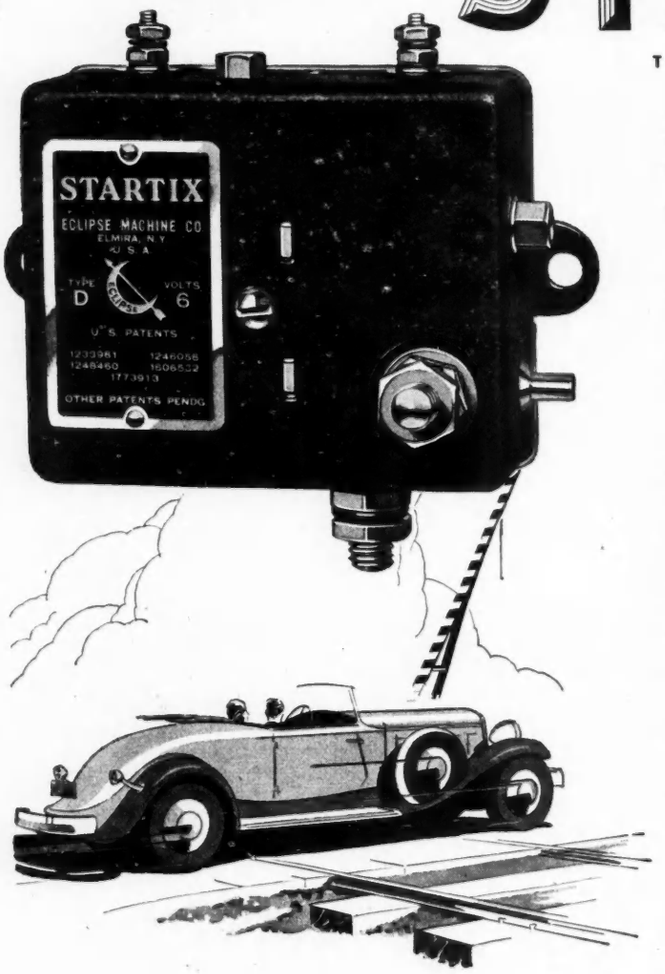
WYMAN-GORDON

AUTOMOTIVE & AVIATION
FORGINGS
WORCESTER, MASS.
HARVEY, ILL.

# Both mean

## BENDIX STARTIX

THE AUTOMATIC STARTING SWITCH




No unit in recent years has added more to the safety and convenience of motoring than Bendix' newest contribution—Startix.

Startix means safety because it automatically protects you from the danger of a stalled engine in traffic, on hills and at railroad crossings.

Startix means convenience, too, because it eliminates the need of a starter button. You simply turn the ignition key "on" and Startix starts the engine instantly; automatically re-starts the engine if it stalls—all without thought or effort on your part. Startix is always in full automatic control of your engine as long as the ignition is turned "on".

Startix is built by the makers of the Bendix Drive; its convenience and safety features have led to its adoption on many of the new 1932 model cars. Startix can be easily installed on any car equipped with the Bendix drive. Any car is a better car if it is Bendix-equipped.

ECLIPSE MACHINE COMPANY, Elmira, N. Y.
(SUBSIDIARY OF BENDIX AVIATION CORPORATION)

*The*
BENDIX
DRIVE

Standard on more than twenty million cars running today. So reliable, so dependable, its performance is taken for granted.

# BENDIX

## AUTOMOBILE

AUTOMOTIVE INDUSTRIES
VOLUME 66 — APRIL 2, 1932 — NUMBER 14

# Details Will Make or Break Sales Meetings Held for Dealers

## If a meeting is worth holding, it is worth the planning and managership required to make it helpful and successful

by Norman G. Shidle

WHEN is a good idea not a good idea? The answer is, "When it's *not* worked out correctly."

In 12 years of attending meetings of various kinds, held by parts and vehicle factories for the purpose of "educating" dealers, we still can count on the fingers of our two hands the sessions which were properly organized and properly run off.

Very little advance planning and very little changing would have been needed in scores of instances to transform a below-par meeting into a bang-up, useful gathering. The trouble rarely lies in the realm of expense. It usually comes from failure on the part of those responsible to take seriously what seem to them to be *small* matters in advance organizing.

If a meeting is worth holding, it is *worth planning what is to be said* and *how it is to be said.* And unless the speaker is one of the relatively rare extemporaneous speakers, it is worth his time learning what he is going to say and how he is going to say it. Too often a speaker makes an extemporaneous speech urging dealers to adopt some sales or management plan and to follow it through in a detailed manner, and the urging is done in an obviously unplanned speech.

Here's what happens too often:

A dealer meeting or a series of dealer meetings are decided on. The factory sales manager and his aides may spend considerable time deciding on the theme of the session and the main points to be brought out. Then the speakers are chosen.

A local representative is told the date of the meeting, instructed to procure a meeting place, told to arrange a luncheon and a few other general items. He makes the arrangements, the factory troupe arrives on the morning of the meeting, and the play is on!

Often there has never been a rehearsal. Usually but meager attention has been given to details of stage

setting. Too often the talks of the different speakers have been keyed together as to time and subject matter only in the most general terms.

Thousands of dollars are spent every year by the automotive industry on just such semi-organized sales meetings. Talk of detailed rehearsal fills the average executive with deep embarrassment, and the higher he is in the executive scale the more his influence weighs against real planning and operation of a meeting.

How often has a meeting been wrecked because the president of the company himself—the last man in the world to be coerced into rehearsal—talked too long, wandered too far from the subject or monotoned respectful retailers to mental slumber?

How often is serious attention given to the lighting of the meeting room, the acoustics, the facilities for showing charts and pictures, the dramatics as opposed to the statistical phases of chart presentation, the arrangement of the seating, the method and character of introductory remarks and the score of other details that make or break a sales meeting?

If the average factory executive had a natural and subconscious feeling for the dramatic; if he almost unconsciously got the feel of an audience and its reaction, things wouldn't work out as badly as they often do. But unless he is quite unusual he hasn't any such sense. His training, his thinking, his experience are all against its being developed. He's a business man—not an actor.

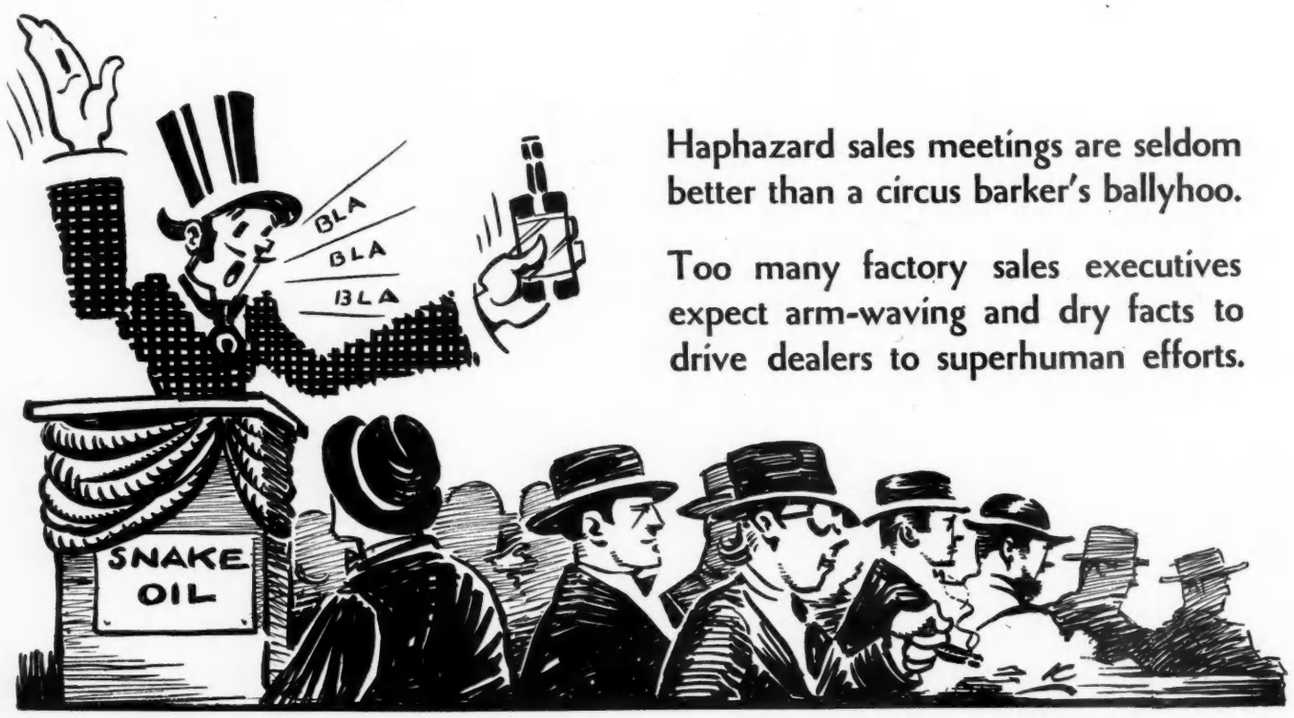
But running or participating in a sales meeting is in essence directing or acting in a play. The executive who is not willing to give the time and thought needed to those details which go to make a successful play of this particular kind is better off the program, however intelligent he may be and however profound the thoughts which are in his head.

Executives can't be made into finished actors for an occasion. But they can insist on every detail of a meeting being worked out in advance so that lack of dramatic instinct may be compensated for by organization following known methods of running a successful sales gathering.

This year has seen the elimination of most of the social excrescences of sales meetings. But still thousands of dollars worth of time of retailers and factory men is being wasted due to lack of proper advance organization of sales meeting. It isn't fair to the dealers. And it isn't fair to executives themselves who are putting in 100 per cent of energy and getting out 20 per cent of results.

We know one factory sales executive who used to be an actor. He is perhaps the most enthusiastically welcomed speaker in automotive sales ranks today. That isn't because he cuts up capers or does card tricks. It isn't because he's much of a humorist. It isn't because he's much of an orator. It's because he has a clear "feel" of his audience from the moment he gets up until he sits down. We've seen him more than once "save" a meeting by refraining from making a wonderful talk—simply because he "felt" that the audience was fed up before he got on his feet. And he just automatically and casually sacrificed his own desire to speak his piece because the preceding speaker had failed through the last half hour of a long talk to "feel" his audience's boredom. He was doing a job—not worrying about self-glorification.

More sales meetings are wrecked before they ever start than are hurled to success after the toastmaster has introduced the first speaker. Let's put more time on planning sales meetings—and let's permit the "stage director" more complete authority in directing and criticizing the actors! It isn't fair to bring scores of dealers together from long distances and then ask them to listen while a series of speeches are read from manuscript. And a lot of other similar things aren't fair. Get a factory "stage director"—and let him do his stuff!




**Haphazard sales meetings are seldom better than a circus barker's ballyhoo.**

**Too many factory sales executives expect arm-waving and dry facts to drive dealers to superhuman efforts.**

# JUST AMONG OURSELVES

## Taxes Constitute a Major Cost

FIGHTING to keep itself from being burdened with unfair *special* taxes, the automotive industry has always emphasized its willingness to bear its share of any general tax loads found necessary by government.

A sound attitude that, provided government wisely spends the money collected. But when governmental wastes continue at a time that business has cut its cost to the quick, we are faced with a different kind of fight. The automotive industry now finds itself fighting—not *against* other industries to avoid a special tax—but *with* other industries to force lower taxes through reduction in government expenditures.

Taxation bids fair to be a major cost in the operations of American business this year. Merle Thorpe's keen analysis and vivid illustration of how government money is spent for needless operations sounded a keynote for the industry at the N.A.C.C. dinner in January. Mr. Thorpe was widely praised throughout the industry for that talk. Let's not forget the purport of what he said!

## 'Tis Pruning Time Now

THE seriousness of the situation is reemphasized every day by statements of outstanding business leaders. E. L. Cord is among those who have expressed themselves vigorously in recent weeks. "The mad orgy of governmental spending, the terrifying increases in taxes, the appalling situations to which our Federal, state and municipal governments have drifted, the chaos which is threatening our whole governmental structure are readily apparent today," the Auburn president said in a recent interview with the Chicago *Daily News*.

"Most of us in the past have been content with conversation about what ought to be done," he went on to say. "There is ample room for economy without interfering with the necessary functions of government. Dozens of commissions and bureaus could and should be eliminated completely. Others should cease all but the most necessary activities. The government should withdraw from participation in business. . . . The individual voter . . . must insist that there be a reduction in taxes."

## After All, It Is Behind Us

WELL, the new Ford has finally been announced. The new Plymouth is out. General Motors special shows are on. The advertising campaigns based on the "Don't-buy-anything-until-you've-seen-ours" idea have been launched.

Heavy cleanups of old models have been pretty well completed on several important lines. The last snows of the year are flurrying. Spring has been here officially for several weeks and can be expected to arrive in actuality very shortly all over the country. The poorest first quarter in many years has been written into history.

Plenty of trouble and uncertainty, in other words, is behind us. Millions of dollars in money are being spent to dramatize automotive merchandise, improve retail selling power and better the sales showing of recent months. The stage is set for the spring drive. Stout hearts are believing that it's not going to be a rainy spring—barometrically nor financially.

## "Sharp" Buying Menaces Quality

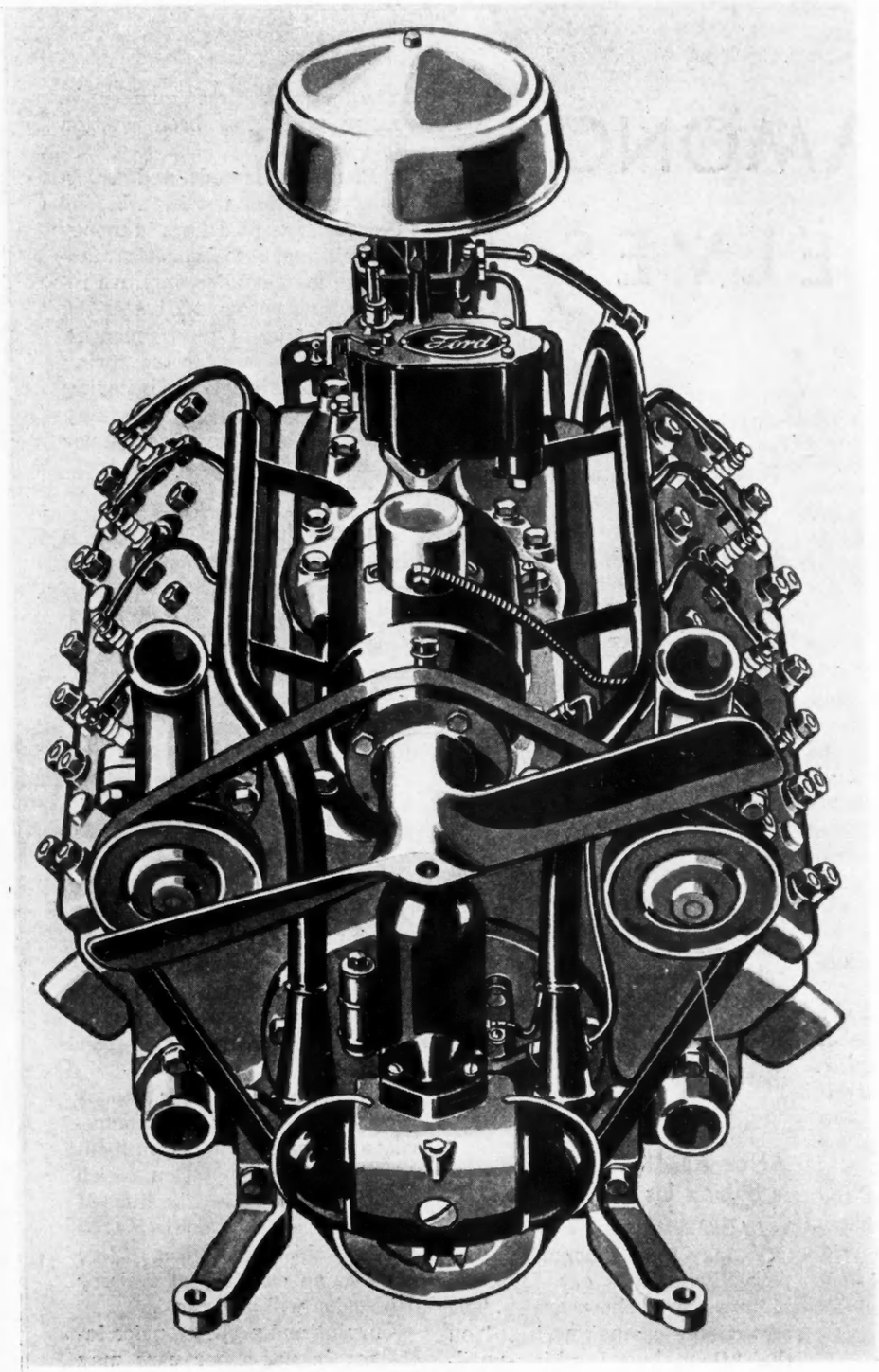
BELOW-COST buying has no more economic justification today than it ever had. The manufacturer who chisels all the profit out of the parts or machinery which he purchases thereby forges himself firmly into the vicious chain of action which has bound us so long to depression.

Below-cost buying makes quality suffer. It always will make quality suffer so long as men are men and business is conducted for profit. Smart buyers sometimes prosper temporarily. But their smartness too frequently runs around and kicks them from behind.

Every manufacturer today feels that he is forced by competition to squeeze the last mill out of every price quotation which comes to him. When he himself sells, he is being subjected to similar chiseling. But there must be an end to that cycle or depression will never end.

Current and proposed price increases in passenger cars may help materially to better conditions. Once the possibility of a rising market price is established in the public mind, buying may be stimulated. And when that happens the whole price structure of the industry down through parts, accessory and factory equipment should benefit.

—N.G.S.




# Ford's at $460;

## Ford V-8

### Engine

90-deg. V type
30 hp. (S.A.E.)
65 b.hp. at 3400 r.p.m.
Compression ratio 5.5:1
Aluminum alloy pistons
Bore, 3 1/16 in.
Stroke, 3¾ in.
Ports cored in cylinder
Tappetless valves
Engine weighs 581 lb.
Three-point suspension
Rubber mountings

### Crankshaft

90-deg. type
65 lb.
Statically balanced
Dynamically balanced
Floating connecting rod bearings
Force-feed lubrication

### Transmission

Three speed, forward
Helical silent second
Synchronized

### Rear Axle

Ratio, 4.33 to 1
Similar in design to Model "A"

### Frame

Double drop
Five cross-members
Side rails conform to part of body contour

### Brakes

Double shoe
Cast-iron drums 12 x 1½ in.
Wheels, 18 in.
Tires, 5.25/18 in.

### Accessories

Fuel pump
Two water pumps
Aero-type fan
Automatic spark control
Houdaille shock absorbers, automatic control

Cast in a single block, embodying unusual details in design, the Ford V-8 engine is of the 90-deg. type, with a statically and dynamically balanced crankshaft of 90 deg.

This top-front view shows the novel timing arrangement, near the bottom of the engine, driven directly from the camshaft. Two water-pump pulleys and the fan pulley are driven by the single vee belt. The generator shaft carries the fan.

A single downdraft carburetor supplies the fuel from a cam-driven diaphragm fuel pump, served from a 14-gal. tank at the rear of the car.

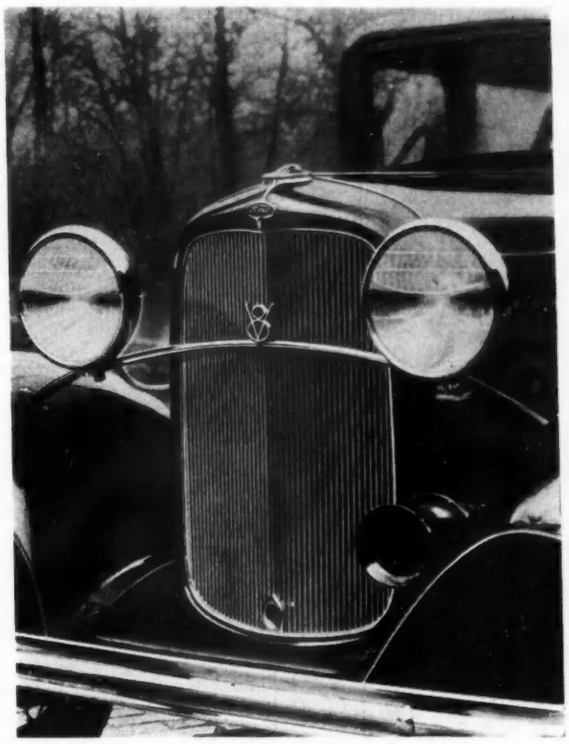
# 65 hp. V-Eight Priced New Four From $410

By James W. Cottrell

WITH stagecraft bringing back memories of David Belasco, the new Ford V-8 was introduced to dealers at branch assembly plants on Tuesday, March 29. Black velvet hangings draped a stage in the center of a room, and a "mike" and loud-speakers carried the words of the speaker throughout the room. Dealers and their staffs, awaiting the unveiling with all the anxiety of first-nighters, were entertained by a discussion of general business conditions, the effect which the revival of Ford business would have upon these conditions and an explanation of how much work on the part of Mr. Henry Ford and his employees was involved in the production of the car. Meanwhile, the stragglers were filling the aisles of the temporary auditorium.

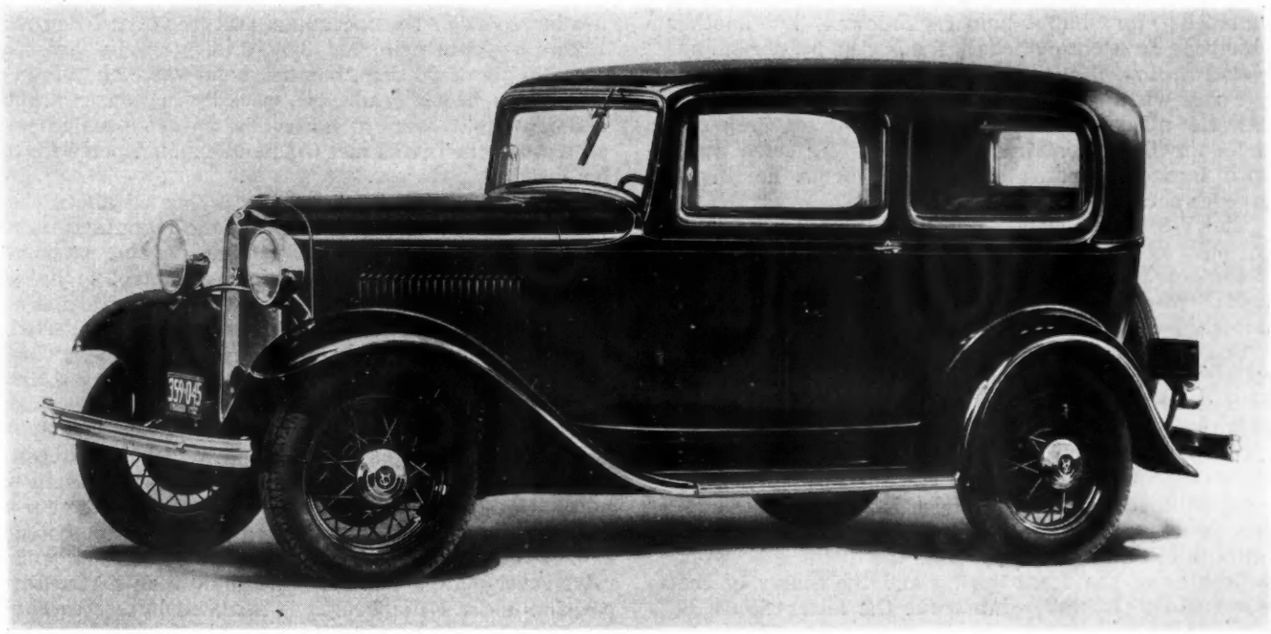
Lights switched off, and a spotlight was thrown on the stage curtains revealing in turn a photograph of Mr. Ford and the V-8 symbol which appears on the lamp-bar and hub caps of the new car. Darkness again; then the sound of an engine being started, first, second and high gear engaged and then terrific acceleration. Dawn came gradually by careful manipulation of lights introduced by Mr. Belasco in his Broadway hit, "The Easiest Way."

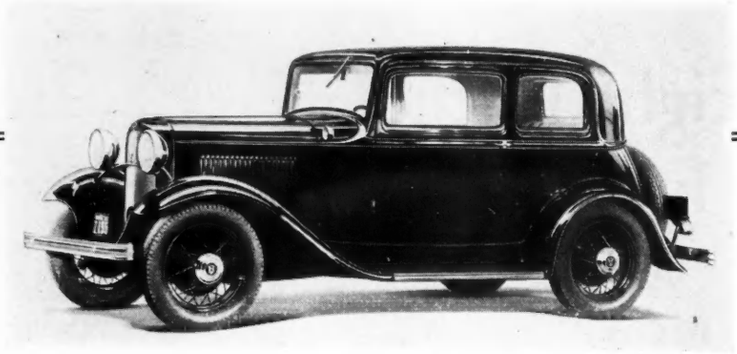
Thunderous applause when bright lights revealed



V-front radiator of the new eight-cylinder Ford, with enameled radiator shell

Below: Ford V-8 Tudor sedan, on a wheelbase of approximately 106 in. Distance from center of front spring to center of rear spring is 112 in. List price $500. Note low, sweeping lines and rounded corners and sloping windshield. Overall height about 67 in. to top of roof





New Ford V-8 Victoria, listing at $600

## Prices

| Body Type | New V-8 | New Four | Model A | Last Model T |
|---|---|---|---|---|
| Roadstser | $460 | $410 | $430 | $360 |
| Phaeton | 495 | 445 | 435 | 380 |
| Tudor Sedan | 500 | 450 | 490 | 495 |
| Coupe | 490 | 440 | 490 | 485 |
| Sport Coupe | 535 | 485 | 500 | ... |
| Fordor Sedan | 590 | 540 | 590 | 545 |
| DeLuxe Roadster | 500 | 450 | 475 | ... |
| DeLuxe Phaeton | 545 | 495 | 580 | ... |
| DeLuxe Tudor Sedan | 550 | 500 | 525 | ... |
| DeLuxe Coupe | 575 | 525 | 525 | ... |
| Cabriolet | 610 | 560 | 595 | ... |
| DeLuxe Fordor Sedan | 645 | 595 | 630 | ... |
| Victoria | 600 | 550 | 580 | ... |
| Convertible Sedan | 650 | 600 | 640 | ... |

the new V-8 prima donna. Longer, lower (about 67 in. at the center of the roof), wider corners rounded off, V-front, smaller wheels, much larger hub caps, springing entirely concealed, sloping windshield with external cleaner. Fourteen body types in both the V-8 and four are offered.

The improved 4-cylinder engine was on the premises, but it was sadly neglected in favor of its more-cylindered comrade, the star of the showing.

More discussion from the loud-speaker, then a stampede for buffet-supper, followed by another stampede to a cut-out chassis guarded by chromium-plated railing.

Those wishing to see the inner construction of the new car piled around the railing about ten deep and those unwilling remaining at the railing came away with horizontal pains and worries about horizontal grooves across the chest.

The V-8 engine embodies details of design unusual, not only to Ford, but to the industry. The new Ford V-8 engine is compact and remarkably free from vibration. Overlapping impulses deliver the power in a smooth, constant flow.

The engine is of the 90-deg. V-type, having an S.A.E. rating of 30 hp. and developing 65 b.hp. at 3400 r.p.m. Pistons are of aluminum alloy split skirt type and have three rings, the lower acting as an oil control ring.

Pins are ¾ in. in diameter locked with a wire ring like model "A."

Wheelbase of the new model is 106 in. although this figure will not be used in selling. The favored figure is 112 in. which represents the distance between the center of the front spring and the center of the rear spring. It was pointed out the latter figure is more nearly comparable to wheelbases of other cars because of the offset type of mounting of the Ford rear spring.

Floating type bearings on the connecting rods with an oil film on each side, instead of only one side, valves operated directly by cams without any tappets, three-point suspension with two of the points at the front and the third at the rear, two water pumps driven by a single belt, a distributor mounted on the end of the camshaft within a fraction of an inch of the radiator, are but a few of the uncommon features of the engine.

Two banks of cylinders, 3 1/16 in. x 3¾ in., are set at an angle of 90 deg., but the usual valve alley is incorporated in the crankcase space by inclosures front and rear and cover, in horizontal position, which incorporates the intake manifold and exhaust ports for a hot-spot.

A single downdraft carburetor is located above the center of the cover plate. It bears the manufacturer's label by Detroit Lubricator Co. There are no external mixture adjustments. The mixture control is by a needle valve placed in the center of the vertical air-intake. Over the intake is placed a large inverted metal pan with screen mesh in a circle inside. This device silences the intake rather than acts as an air cleaner, although there is some incidental air-cleaning effect.

Gravity feed of gasoline used on Model A has been abandoned in favor of a rear mounted 14-gal. gasoline tank. Gasoline is supplied from the tank to the carburetor by a diaphragm type pump which is mounted at the rear of the combination intake manifold and valve cover plate assembly. The pump is in horizontal position and the diaphragm is actuated by a straight

vertical rod extending to the camshaft. There is a short gasoline pipe extending from a pump to the carburetor.

The 65-lb. crankshaft is of 90-deg. type and is carried in three main bearings and has integral counterbalances. It is statically and dynamically balanced. Connecting rods are placed side by side on the crankpins. The bearing is of the split floating type with very thin babbitt inside and outside of a thin steel shell. There is, therefore, oil film between the crankpin and the floating bearing and between the bearing and the connecting rod big end. Clearance is .0015 to .003 between bearing and crank pin and .002 to .004 between outside of shell and rod.

Crankshaft bearings are 2 in. in diameter. The shaft is offset 3/16 in. Main bearings are interchangeable bronze-backed type. Caps embody lateral tongues which engage grooves in the case.

Force feed lubrication is supplied to main, connecting rod and camshaft bearings by an oil pump driven from the camshaft by an idler gear, at the rear of the crankcase. Oil from the pump flows under 20 to 25 lb. pressure to the rear camshaft bearing, thence through a deep groove to the rear main bearing. Here another groove admits oil to leads to the crankpin. Oil also flows from the pump through a horizontal tube extending the length of the engine above the camshaft, distributing oil to the center and front camshaft bearings where distribution to main bearings and crankpins is repeated in the same fashion as the rear camshaft and main bearings.

The camshaft is mounted in the bottom of the V, and is driven by silent gear from the crankshaft. Valves have hollow extensions on the bottom of the stems which are closed by hardened steel plates resting upon the cam during opening and closing. The change from valve-stem diameter to the extension diameter forms a mushroom similar to that on the bottom of the Model "A" valve. The valve lock has a slot in the side with a hole in the center larger in diameter than the width of the slot. There is no adjustment of valve tappet clearance. Actual running clearance is from .013 to .018 in.

There is a water pump at the top of each cylinder block with a relatively large outlet and hose extending to the radiator. Pumps are of centrifugal type and there is space enough to permit thermo-syphon cooling should the pump be put out of action. There are no stuffing boxes on the pump shafts and leakage is prevented by spring-loaded packing.

The generator is carried on the front of the valve cover plate-manifold assembly and its drive pulley acts as adjusting idler for the belt which drives the two water pumps. Belt is tightened by raising the generator by means of a threaded sleeve on a round column on which it is supported. The oil pressure regulator valve adjustment is directly under the generator. A two blade airplane propeller type fan is mounted on the end of the generator shaft.

Intake and exhaust ports are cored in cylinder blocks. The intake passages in the valve cover plate are surrounded, as previously stated, by an exhaust heated hot-spot supplied by the two center cylinders on each side. Exhaust from these cylinders after entering the hot-spot chamber is discharged from a port into an exhaust manifold bolted to the outside of the block. Exhaust from the front and rear cylinders, on each block, is carried to the exhaust manifold through a passage in the block. Exhaust pipes are attached to the front of the exhaust manifold, the right-hand pipe sweeping downward under the pan and that on the left is carried around in front of the engine and joins exhaust pipe on the right under the pan.

## Moves To Prevent Wild Trading

**During at least one meeting where Ford dealers were introduced to the new 4's and 8's, Ford officials told the dealers that they would be expected to show a 20 per cent gross profit on used cars, to eliminate cut-throat competition in trading for new business. The impression was created that dealers who could not demonstrate such a profit would have their contracts cancelled.**

Spark timing advance is controlled only by a vacuum type governor. The ignition unit is bolted to the front of the engine and driven by the camshaft. It is removable for attention to the breaker-points.

The coupling to the shaft insures correct timing when the unit is replaced. The distributor is of unusual design with distributor-arms revolving at right angles to distributor caps instead of in a plane parallel therewith. High tension current from a Mallory coil is carried in concealed wiring to a brush contacting a copper ring on the shaft. Two arms distribute current to the two distributor caps each arm to two cylinders in each block. There is provision for changing the timing in the unit up to plus or minus 7 deg.

Compression ratio is 5.5 to 1, the combustion chamber being heart shaped with a flat section with almost no clearance opposite the valve area. Spark plugs are Champion C4 type. Insulated ignition wires are carried in metal conduits from distributor to cylinder heads.

The engine, which weighs 581 lb. without the transmission is supported at the front on two angle "feet." Under each of these supports is placed a 2 in. rubber biscuit put under compression by a bolt. The rear mounting is a large molded rubber trunnion, about 8 in. in diameter, incorporated in the vertical section of a center cross-member. There is no metal contact between engine and frame. Two "stabilizers" which are steel rods, extend from the cross-member to flat surfaces on the crankcase, where engine arms ordinarily would be placed. These rods are to prevent forward motion of the engine in the rubber supports during sudden brake applications.

The front axle is similar in design to the Model "A" and the front double radius rod "wish-bone" is retained, but it is fastened at the rear to the center cross-member at the rear of the transmission, which contains the rear rubber engine mounting. This construction avoids breaking the transmission case in event of front-end collision. Rear end of the wish-bone terminates in a ball, as on Model A, and is insulated by rubber.

Transmission has three speeds forward, with silent second provided by helical gears for the countershaft and second speed gears. There is a synchronizing mechanism for second and high which embodies a tapered collar, with internal-external gear-type clutches.

There is no free-wheeling mechanism, contrary to preliminary gossip on the subject.

*(Turn to page 540, please)*

# Larger Plymouth Incor

by Athel F. Denham

THE new Plymouth makes its public bow Sunday, April 3. While it has many new features, among which are an X-member frame, the combination of free wheeling, a silent-second transmission, and automatic clutch control (the latter at $8 extra), Centrifuse brake drums, smaller wheels, larger tires, and increased power, by far the most important feature of the new cars is their increased size and attractive bodies. Floating power, of course, remains a major sales feature.

On the longer wheelbase of 112 in., Plymouth Motor Corp. presents nine body types, ranging in price from $495 to $745. At the lower end of the price-range, the roadster model has been reduced from $535 to $495. At the upper end two new models have been added, a seven-passenger sedan listing at $725 and a convertible sedan at $745. Other body model prices remain unchanged, except for the two-door sedan, which has been dropped from the line.

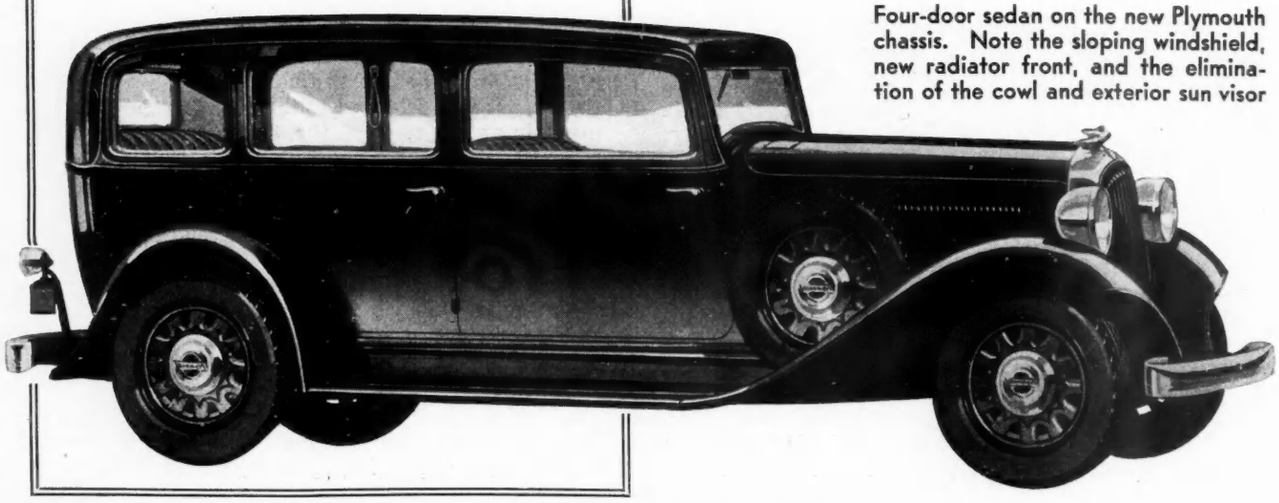
Interior dimensions of bodies have been increased in proportion to the increase in wheelbase length. The hood extends to the base of the windshield and overlaps the cowl. It will be noted from the illustrations that the radiator slopes forward and is rounded off at the lower end of the false front with vertical

## New Specifications.

(Unless noted here, specifications remain as formerly)

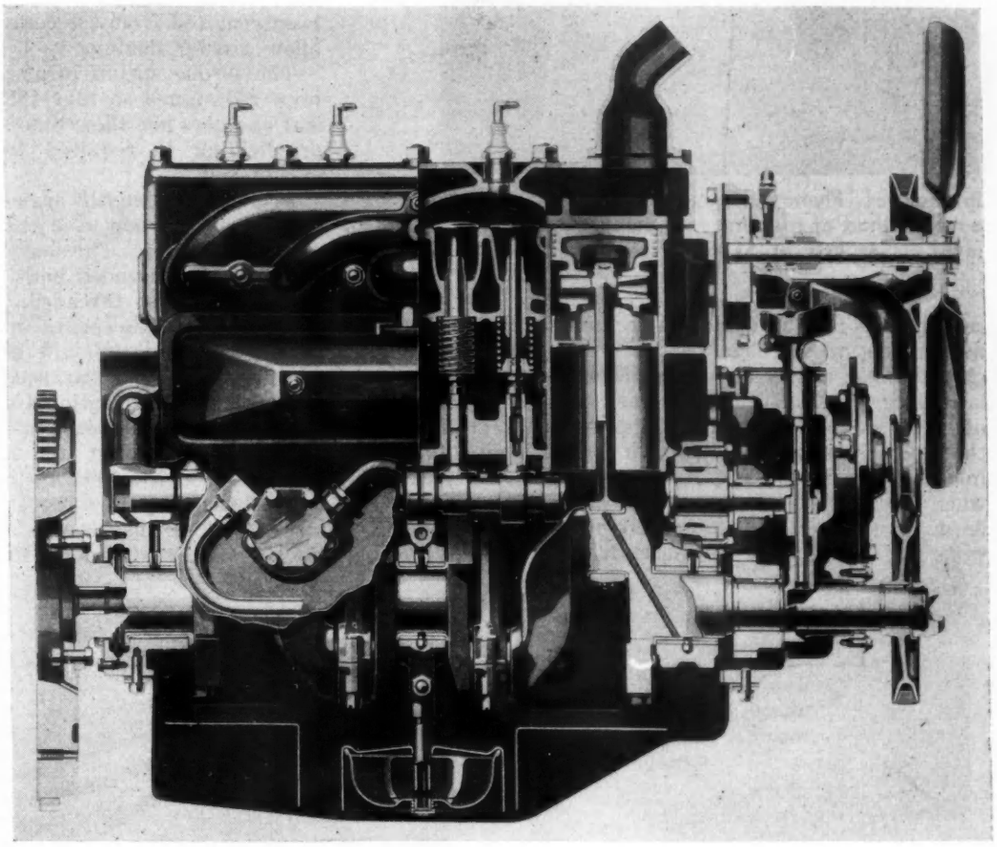
| | NEW | OLD |
|---|---|---|
| Wheelbase | 112 in. | 109 3/8 in. |
| Overall length without bumpers | 159 1/8 | 155 17/32 |
| Tire size | 5.25/18 | 4.75/19 |
| Wheels | Wire or dem. Wood | Wire |
| Wheel diam. | 18 in. | 19 in. |
| Max. hp. | 65-3000 | 56-2800 |
| Max. torque | 136-1800 | 130-1600 |
| Carburetor make | B & B | Carter |
| Model No. | 4-A | RT-08 |
| Nominal size | 1 1/4 | 1 1/8 in. |
| Accel. pump | Yes | ..... |
| Jets type | Fixed | ..... |
| Intake silencer | Yes | No |
| Crankshaft Counterweighted? | Yes* | No |
| Crankshaft weight | 55 lb. | ..... |
| No. counterweights | 4 | None |
| Main bearings | Steel-backed babbitt | Bronze-backed babbitt |
| Bearing length | | |
| Front | 2 3/64 | 2 1/8 |
| No. 2 | 1 15/32 | 1 5/8 |
| No. 3 | 2 3/8 | 2 3/8 |
| Total | 5 57/64 | 6 1/8 |
| Exh. valve diam. | 1.834 | 1.594 |
| Valve spring retainers | split cone | pin |
| Port diam. Exhaust | 1 11/16 | 1 7/16 in. |
| Auto spark advance | 14°-2920 | 18°-2400 |
| Breaker timed at | 10° BTDC | ..... |
| Spark plugs | 14 mm. | 18 mm. |
| Exh. pipe diam. | 1 3/4 | 1 5/8 |
| Muffler diam. | 6 in. | 5 in. |
| Oil filter | Yes | No |
| Radiator core thickness | 2 1/4 in. | 2 in. |
| Clutch control | Vacuum | None |
| Extra cost | $8 | Not available |
| Transmission gears | helical | * |
| Rear axle, tread | 56 15/16 in. | 57 in. |
| Road clearance | 8 1/4 in. | 8 1/2 in. |
| Brake drums type | Centrifuse | Pressed steel |
| Make | Motor Wheel | ..... |
| Frame type | X-member | Conventional |
| Stock thickness | 1/8 in. | 9/64 in. |
| Max. depth | 6 in. | 5 1/2 in. |
| Springs, front length | 35 11/16 in. | 35 1/2 in. |
| Shackles | Threaded U-bolt | Tapered bearing |
| Front of rear spring | Silentbloc | Silentbloc |
| Kick shackle? | Yes | * |

* Note: Change went into effect during last few months



Four-door sedan on the new Plymouth chassis. Note the sloping windshield, new radiator front, and the elimination of the cowl and exterior sun visor

# porates Transmission Improvements



A section through the Plymouth engine reveals a counterweighted crankshaft and larger exhaust valves. Horsepower has been increased to 65 at 3000 r.p.m.

vanes. Other features of modern styling embodied in the new Plymouth include a sloping windshield, sloping front pillars and improved fenders. Wood and wire wheels are optional equipment, which is unusual in this price class.

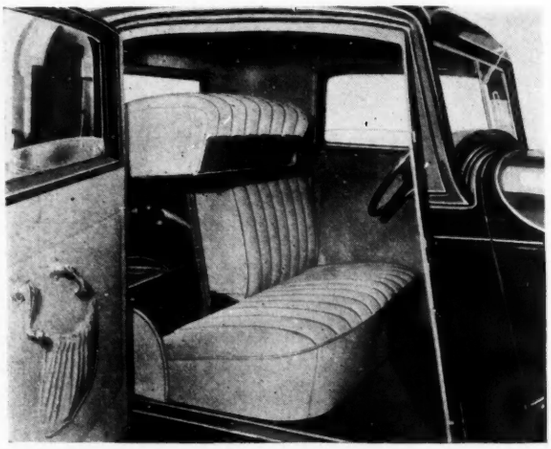
The increase in horsepower has been obtained by enlarging the exhaust ports and increasing the diameters of the exhaust manifold, exhaust pipe and muffler. The muffler is of the "resonator" or tuned type, similar in operation to that of an intake silencer. The new carburetors are also somewhat larger and incorporate an accelerating pump. This, together with some changes in the spark advance curve, has resulted in raising both the maximum torque and maximum horsepower, as well as the speeds at which they are obtained. The intake manifold heater has been improved in design, and manifold castings are annealed before machining to remove strains and prevent distortion. Carburetors are of the fixed-jet type, with only one adjustment—that for idling. The choke and throttle-valve controls are interconnected so that when the choke is pulled out the throttle is opened far enough to prevent over-choking. With the same end in view, an auxiliary choke valve is provided, which opens up automatically to allow air to enter. An intake silencer has been added to the equipment, and a shield is now placed around the air cleaner, with an opening toward the dash, the object of this shield being to reduce the amount of dust reaching the air cleaner.

Counterweights on the crankshaft were introduced a few months ago, and the crankshaft now weighs 55 lb. The shaft is mounted in steel-backed, babbitt-lined bearings of the same diameter as formerly.

An oil filter has been added as standard equipment. Valve springs are made with a variable "pitch" to reduce their tendency toward high-speed flutter, and spring retainers are of the split-cone type. An opening on the left front side of the flywheel housing exposes the timing marks on the flywheel. The auxiliary vacuum spark advance, which reduces the tendency to stall while idling, is retained.

To take care of the increased engine torque and the automatic clutch mechanism, clutch pressure springs have been increased in weight, and release springs redesigned. The vacuum clutch control is similar to that used on other products of the Chrysler Corp.

Helical gear transmissions were adopted a few months ago, and to these and the roller-type free-wheel-



Interior of Plymouth coupe showing novel method of reaching rear compartment. Car lists at $565, as formerly

ing unit has now been added a vacuum clutch-operating mechanism, which obviates the need of touching the clutch under nearly all driving conditions.

Pulling on a button on the dash cuts out the action of the free-wheeling unit and the automatic clutch, so that the car can be operated as a conventional automobile if desired. Both units are automatically locked when the reverse is engaged, but as soon as the shift lever is returned to neutral from reverse the free-wheeling unit and automatic clutch become effective.

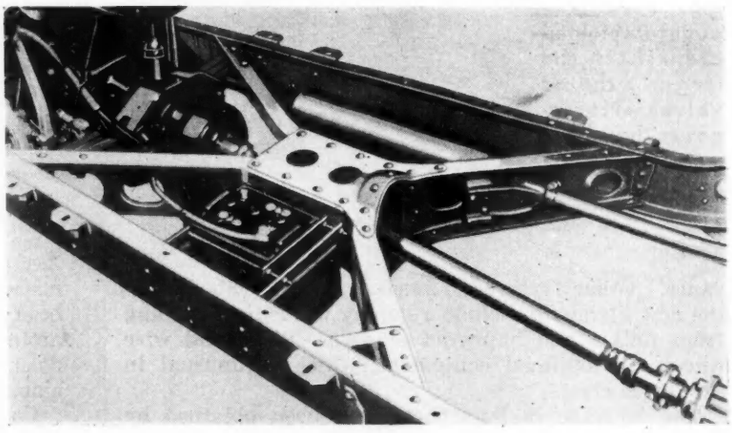
Frames, as has been noted, are of the X-member type. They have deeper side channels. Center running-board brackets extend to the center section of the X-member, tying the side channels at still another point, and adding strength to the running-board assemblies. Front frame cross-members are now formed to carry the powerplant front-support bracket, thus eliminating the triangular bracket formerly placed at this point.

The powerplant rear support is now made wider and is secured to the housing of the free-wheeling unit by four instead of two bolts. A section of rubber has been removed from the center of the rear insulator to allow greater flexing.

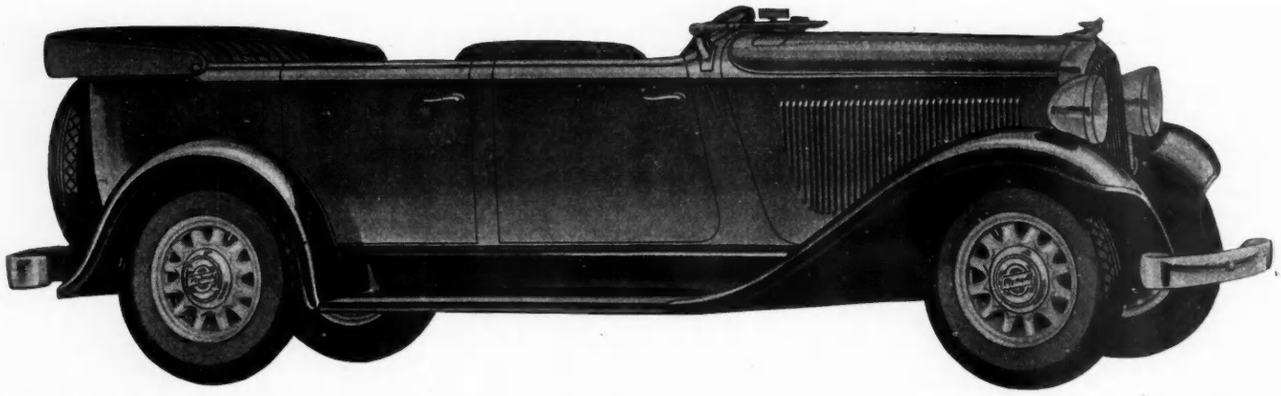
The torque spring insulator on the frame also has been redesigned so that the rubber grips the spring leaf and does not allow it to slip, the rubber stretching or yielding if required by the movement of the spring end.

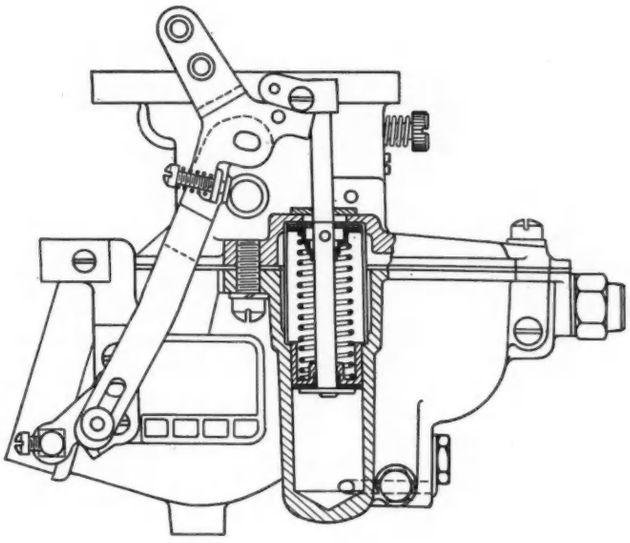
Front spring lengths have been increased and "silent-U shackles" are now used at the rear ends of both front and rear springs. These shackles consist of two hardened sleeves, threaded both inside and out, and a U-shaped link, also threaded. The sleeves are screwed into the eyes of the spring and the frame-horn brackets, and at the same time the legs of the U are threaded into the sleeves. Clearance between the threads permits freedom of rotational movement due to the provision of clearance between the threads. The threads take the side thrust and lubricant forced into the shackle through a Zerk fitting forms a cushion at the base of the threads. The shackle requires no adjustment. A kick shackle was added at the front end of the left front spring some time ago to eliminate wheel

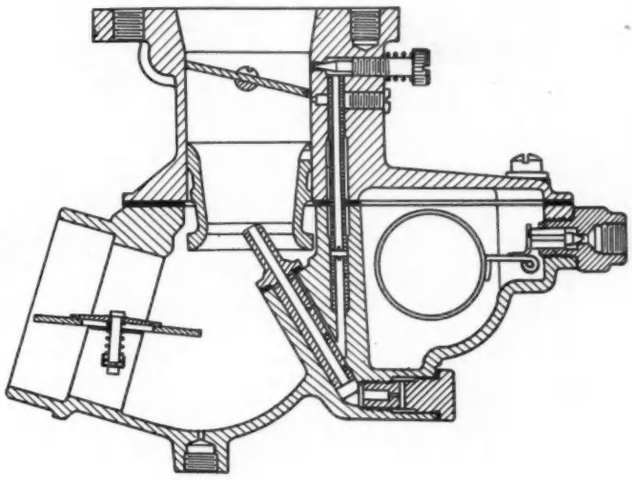
Top view of the Plymouth chassis showing the new X-member frame and resonator muffler



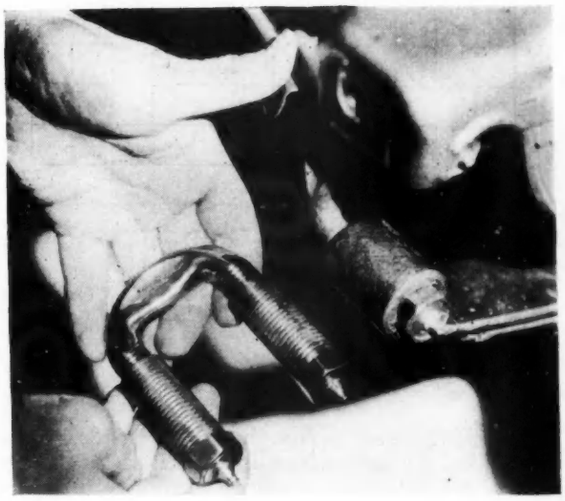
New 1932 Plymouth phaeton on 112-in. wheelbase







**Above: Two drawings of the new B & B carburetor of the Plymouth, that on the left showing the accelerator pump in section**



**On right: The new U-type spring shackle with threaded bearing surface**

fight. The left steering knuckle arm ball has been raised slightly.

Fenders are new and of one-piece construction; they are rust-proofed before finishing. A second frame bracket at the center of the fender adds strength to the assembly and prevents drumming. There are two top cowl ventilators in the hood, and the latter is locked through a single central control handle and concealed locks.

Bodies continue of the all-steel type. Belt moldings are somewhat higher than formerly. Sound-proofing has been further improved in closed models, all cars are wired for radio without extra cost, and Duplate safety glass is available in all models at slightly extra cost. Body appointments of the four-door sedan include assist cords, ash receivers, rear curtains, braided robe cord, adjustable front seat and inside locking right door handle.

# Brown-Lipe Multi-Speed Truck Transmissions

THE Brown-Lipe Gear Division of the Spicer Mfg. Co., Toledo, Ohio, is now offering to manufacturers of commercial vehicles transmission units comprising a single-plate friction clutch, a standard four-speed transmission, and a supplementary transmission which is bolted to the rear of the regular transmission, the design being such as to give the impression of a single unit, a single cover plate extending over both the main and the supplementary transmission.

The supplementary transmission unit is made in three different designs, adding one, four and eight forward speeds respectively to those of the main transmission. One of the supplementary units provides merely an over-drive, while the second provides a direct drive and a speed reduction, each of which can be used in combination with any of the speeds of the main transmission, so that a total of eight forward and two reverse speeds is obtained. The third supplementary unit comprises a direct drive, a reduction and an over-drive, any one of which can be used in combination with any of the speeds of the main transmission, so that there is a choice of 12 forward and three reverse speeds. In the transmission in which the supplementary unit provides an over-drive only the secondary shaft of the main transmission extends beyond its rear bearing and there carries a gear which can be enmeshed with a smaller gear on the main driveshaft by sliding the latter gear endwise.

The transmissions are made in three different sizes, of which the smallest is not provided with the three-speed supplementary unit.

# Drag of Cars Charted in Wind Tunnel

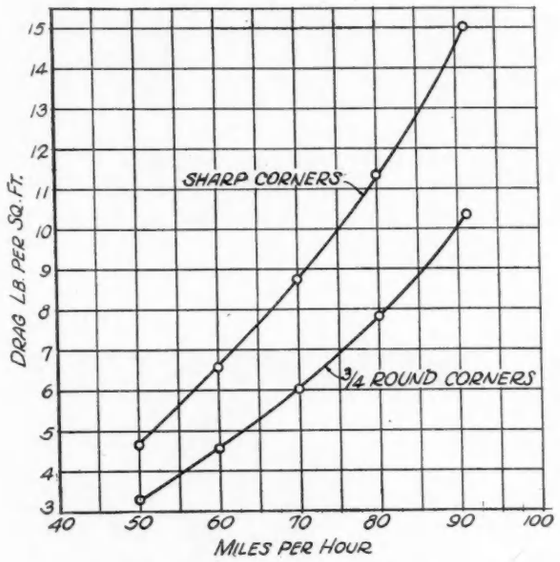



**Fig. 1—Wind resistance per sq. ft. of projected area on rectangular model with sharp and rounded corners**

A PROGRESS report has been made by Prof. W. E. Lay on an investigation of the aerodynamic characteristics of simple body forms, based on tests made in the wind tunnel of the Department of Aeronautical Engineering, University of Michigan. The tests were conducted by three graduate students, Messrs. Smellie, Fries and Lowry.

Air resistance is usually expressed mathematically by the equation:

$$R = K A V^2,$$

where $R$ is the air resistance force in pounds;

$V$, the car speed in miles per hour;

$A$, the forwardly projected area in square feet, and

$K$, an experimental coefficient depending on the form of the car.

The air resistance may also be considered as made up of two items, viz., skin friction and form resistance.

Skin friction is due to the viscosity of the air and the frictional resistance between it and the surface of the car. It is always present in moving bodies and can be reduced but little. This item constitutes only 10 to 15 per cent of the total air resistance of the present-day car.

The remaining 85 to 90 per cent, the form resistance, is due to whirls and eddies set up as the car passes through the atmosphere. Theoretically this may be entirely eliminated.

The most active fish and the swiftest birds are streamlined by nature, so that they move through their native element with the least possible resistance. The contours of the airship and the airplane have been developed most carefully, but the automobile, the bus, and even the truck, which are now driven at speeds comparable to that of the early airplanes, have been sadly neglected.

In a passenger car the body, which forms the greater bulk of the vehicle, is essentially a rectangular box or compartment in which may be carried a certain number of passengers. Its shape and size must be about the same whether the car cost $500 or $5,000 and whether it be streamlined or not. As the car moves through the air it must open up a passageway, bore a hole if you please, large enough for this compartment to pass through. In this manner are determined the size, shape and cross-sectional area of the passageway. It then remains for us to lay out a front section to open up this passageway through which our compartment may move and a rear section to close it with the least possible disturbance of the surrounding air.

With this idea in view Model 1 was a rectangular box of such dimensions that it would just inclose a one-eighth scale model of a typical sedan. Model 2 was just like it except that all sharp corners and edges were rounded to a ¾-in. (6-in. full scale) radius.

A center section, the passenger-carrying compartment, was then made up with the same shape and area of greatest cross section but with the top curved slightly from front to rear. Front sections were made with a flat windshield in a vertical position, at a slant of 22½ deg. and 45 deg. with the vertical, and finally an elliptical front section. In like manner four rear sections were made, a stub, medium, 45 deg. and finally a greatly elongated section entirely impractical but completing the series. By various combinations of the

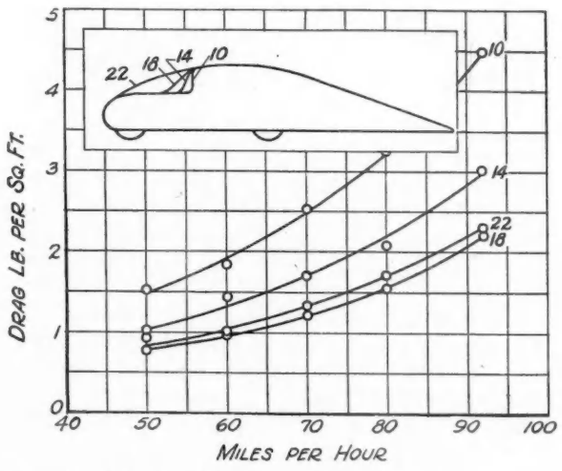



**Fig. 2—Wind resistance per sq. ft. of projected area on automobile models with differently shaped front ends**

# Tests

**Progress report by Lay of University of Michigan shows how air flow was studied qualitatively**

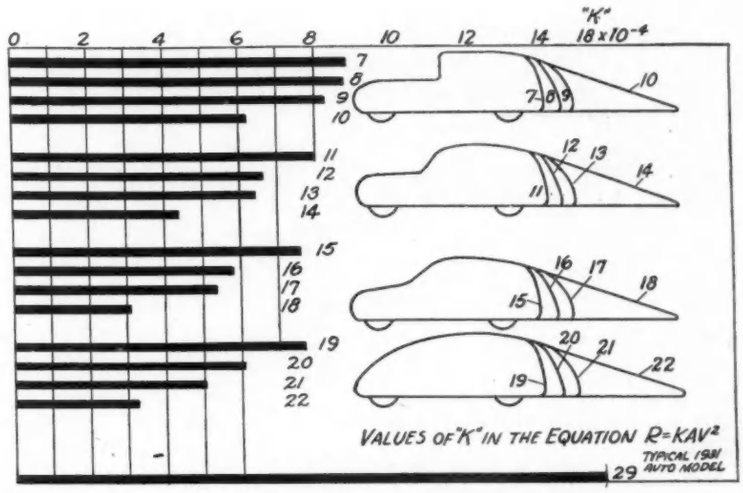



**Fig. 3—Values of air-resistance coefficient as affected by shape of front end**

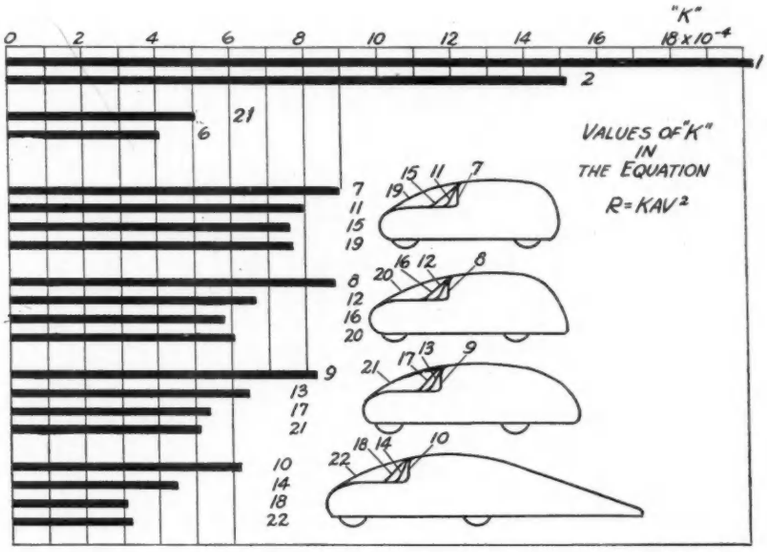
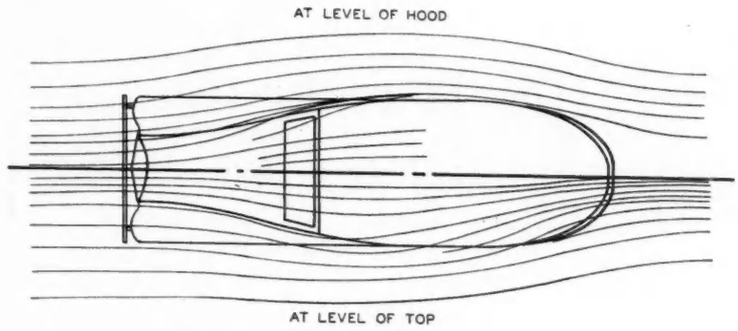



**Fig. 4—Values of air-resistance coefficient as affected by shape of rear end**

mid-section with different front and rear sections, Models 7 to 22 were obtained.

A study was made not only of models but also of test methods. To determine the drag of an airfoil or balloon model is comparatively simple, while the test of an automobile model is complicated by the necessity of providing a road surface. Twenty-one years ago Eiffel tried to use a running belt and found it impracticable because of an uncontrollable flapping. An apparatus capable of driving a moving belt at 90 m.p.h. would be so large that unless it were built integral with the tunnel it would produce greater disturbances in the air stream than the model itself. Nine years ago Jaray used a flat plate as a road surface, but we now know that such an arrangement will not duplicate the conditions under which a car actually operates. It can be built and placed in the air stream in such a manner that it will create little or no disturbance of the air flow in the region about the model, except that it has a boundary layer extending up toward the model. A layer of air adheres to the plate surface and does not move at all. Succeeding layers above the plate flow at increasing speeds until at 0.60 in. above the plate the velocity is only 2 or 3 per cent less than that of the main air stream. This type of flow is termed viscous flow, and the layer in which it occurs is called the boundary layer. There is, however, a similar boundary layer on the undersurface of the model itself, and between the two there is a much reduced velocity of the air moving underneath the body.

It would seem reasonable that if the boundary layer could be removed from the plate surface, so that the air flow along the plate surface was not retarded, the model would be surrounded by the same conditions as the actual car. This suggestion was made by Professor Stalker, and such a plate was made, with some 2000 holes drilled in its upper surface, through which the air of the boundary layer was removed by suction. With this apparatus it was possible to remove only about one-third of the boundary layer. Results obtained by extrapolation indicate that if the boundary layer had been completely removed the results would




Figs. 5 and 6—Air-flow diagrams

have agreed with those obtained by the reflection method.

The remaining method, called the aerodynamic reflection method, used by Rumpler, Pawlowski and others, consists in placing two identical models bottom to bottom. This will produce a neutral plane of air flow between them, whose maximum velocity is practically that of the main air stream, while the pressure effects on the undersurface of the model tested should approach those of the car operating on the road. The lower model is supported entirely by guy wires, and only the upper model is tested.

The tests were conducted in a wind tunnel with an Eiffel chamber and double return ducts. The octagonal throat was reduced to a 6-ft. diameter to obtain speeds up to 90 m.p.h. Test runs were made at 50, 60, 70, 80 and 90 m.p.h. The method of supporting the models in the air stream made it possible to measure not only the drag, but also the front and rear lift and the pitching moment. At first tests were made with the models hanging freely, without provision for a road surface.

In a further series of tests a plate was used, first without provision for the removal of the boundary layer, in accordance with Eiffel's method, and then with provision for the removal of this layer, in accordance with Stalker's suggestion. In making use of the reflection method (two similar models placed bottom to bottom), the lower model was supported by guy wires and in no way connected to the upper model or the weighing scales.

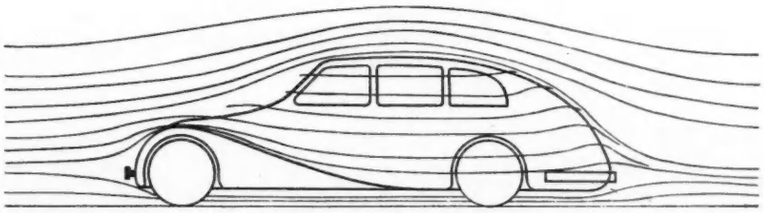
All of the wind tunnel tests results are given in terms of "K," the drag coefficient, expressed in pounds per square foot of area. Although it was not exactly correct, it was convenient to work out the results on the basis that the drag varied as the square of the velocity. All data were plotted on logarithmic graph paper and a straight line faired through the experimental points. The error involved in this method was within the limits of experimental error over the velocity range covered. These results were also plotted against speed. Fig. 1 shows such drag curves for the rectangular models with sharp and with rounded corners and edges. Fig. 2 is a typical curve sheet showing the effect of front-section form variation.

To briefly summarize the results, the values of "K" are represented by the lengths of the black bars on Figs. 3 and 4. At the top in Fig. 3 is shown the value of "K" for Model 1, the rectangular model with sharp edges and corners, while 2 shows the 30 per cent improvement made by rounding the corners and edges. Comparison of Models 21 and 6 shows that a slight convex curvature of the sides of the center section will effect a reduction of over 20 per cent.

The next 16 bars in Fig. 3 represent the variation which may be obtained by the use of different front sections grouped according to the rear section used with them. The maximum reduction obtained by changing the front varies from 14.4 per cent with a poor rear section to nearly 50 per cent with the best rear section. Fig. 4 shows the same data grouped according to the front section used. The maximum reduction obtained by changing the rear contours varied from 30 per cent with the poorest front section to nearly 60 per cent with the best front section. This shows that the rear contour is most important. It also shows that a poor front or rear contour may spoil the effectiveness of an excellent design of the other end of the body.

The air flow about the models may be studied qualitatively by use of a light steel wand and a short length of silk thread. By placing the tip of the wand with its thread in front of the car, its position and direction may be noted and plotted on cross-section paper. Then moving the tip of the wand to where the free end of the thread was before, the line may be continued step by step on the cross-section paper as shown in Figs. 5 and 6 for Model 28. These lines indicate very clearly how a model may be improved from the aerodynamic standpoint.

Full-scale bodies are now being built to be tested on the road to find the relation between the wind tunnel data and the actual operation of the vehicle. The wind-tunnel method is much cheaper and more rapid, and it furnishes much more information than is gained by the road test. At high speeds it is important to know if the vehicle has a pitching moment or any tendency to lift off the ground. These data are easily obtained in the wind tunnel.



Figs. 5 and 6—Air-flow diagrams

# Service Function of Pistons is Used As Basis for Testing and Inspecting

Part I

## German practice discloses behavior of piston materials and design characteristics under actual operation

by Dipl. Ing. Ernst Mahle

WHEN testing or inspecting pistons one should consider first of all the conditions under which this mechanical part must function in service. The piston of a conventional automobile engine is subjected to an explosive pressure of about 450 lb. p. sq. in. at a temperature in the combustion chamber of between 2700 and 3600 deg. Fahr. It is forced down by the explosion pressure and transmits its power to the connecting rod. In addition to the vertical pressure on the crown of the piston there is a lateral pressure on the cylinder wall, due to the angularity of the connecting rod. The cycle of operations is repeated from 1000 to 4000 times per minute, according to engine speed.

Requirements made of piston material and piston design are low weight, good thermal conductivity, great hardness for the piston skirt, for the ring belt and for the piston crown; high resistance to wear under sliding friction; low thermal expansion, so the pistons will not slap—in short, a whole series of properties which it is difficult to find in a single material of construction.

It is therefore no wonder that for a long time many difficulties were occasioned by the pistons, no matter what their design, and that great efforts were made to find better materials and work out better designs. Before the pistons are assembled in the engine, a lot of values must be determined by extensive material tests, so that one may judge intelligently whether material and design justify extensive engine tests.

The following discussion deals with the methods employed in making tests of materials for the purpose of securing the most accurate information concerning the behavior of piston materials and designs in actual operation.

Dynamometer Tests.—In Fig. 1 is shown a conventional cradle dynamometer for engine tests. In addition to the usual readings such as horsepower output, fuel consumption, oil consumption, oil temperature,

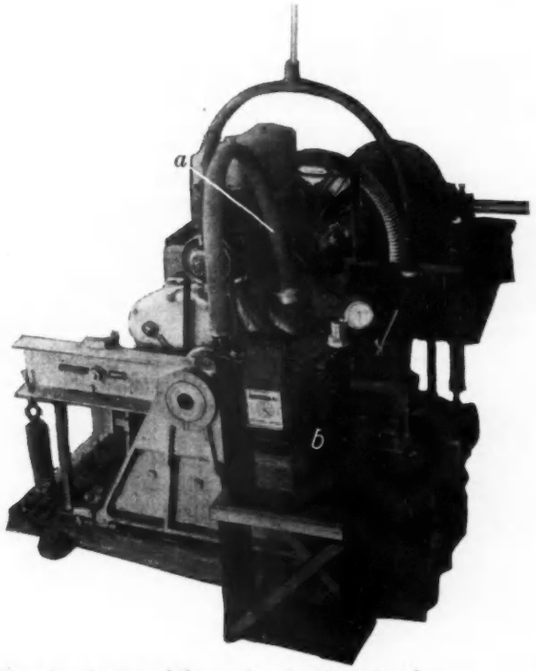



Fig. 1—Automobile engine testing stand with cradle dynamometer and gas meter

temperature of the cooling water at the inlet to and outlet from the jacket, the piston expert must make the following determinations: Power required to "motor" the engine with different numbers of piston rings, at different piston-ring clearances, and different oil temperatures. In addition the "blow-by" of gases from the combustion chamber to the crankcase is measured. It is well known that it is impossible to completely prevent the leakage of gas past the pistons. The rate at which gas blows by the pistons permits of valuable conclusions regarding the quality of the piston seal. For this determination use is made of an ordinary gas meter as found in every residence. The gas meter is connected up to the oil filler of the crankcase (at *a* in Fig. 1) and the amount of gas is read off on the scale *b* of the instrument.

Fig. 2—Determination of piston temperatures under service conditions with fusible cones

Piston Temperatures.—The piston expert is further interested in the actual temperatures of the piston under operating conditions. The most accurate measurement of these temperatures could be made with thermocouples, and this method has been applied repeatedly to low-speed Diesel engines. But in the case of vehicle engines operating on gasoline, one has to figure with speeds up to 4000 r.p.m. and at such speeds it is impossible to attach wires to the inside of the piston. There is, however, another possibility of determining piston temperatures in a simple manner. There exists a series of metallic alloys whose fusion points lie between 120 and 925 deg. Fahr. One therefore takes such alloys, whose melting temperatures are carefully checked, drills a series of small holes in the piston, preferably of ⅛-in. diameter and ⅛-in. depth, and drives small plugs of the fusible alloys into these holes. Fig. 2 shows such a piston after a test run. Some of the fusible cones have been melted out; the rest of them are still intact.

Thermal Conductivity.—Another factor of interest is the thermal conductivity of the piston material, which is highly important in connection with the problem of heat dissipation, owing to the high temperatures occurring in the combustion chamber. Although it is possible to draw conclusions regarding the thermal conductivity from the temperature measurements on the piston, it is better to make determinations of the thermal conductivity of new piston materials in advance.

Fig. 3 shows an apparatus for determining thermal conductivity. A calibrated test piece and a piece to be tested are inserted into a receptacle *b* filled with steam. From each of the test pieces a thermometer leads to the outside. Small platinum wires are fused into these thermometers at scale intervals of 10 deg. C. (18 deg. Fahr.). As soon as the test pieces heat up the mercury rises in the thermometer and closes a circuit through the platinum wires, and this fact is recorded on the drum *c* with a pencil.

Tests therefore are carried out on specimens of pure aluminum (whose thermal conductivity is known) and of some aluminum alloy for pistons, and the time it takes to heat the test specimens from 20 to 90 deg. C. is noted down. From the times thus obtained the thermal conductivities can be determined with sufficient accuracy. Another possibility lies in measurement of the electrical conductivity, which can be accomplished with simple means. It is possible to draw conclusions regarding the thermal conductivity from the electrical conductivity with considerable assurance.

These tests for the determination of the thermal conductivity may be practically supplemented by tests on the complete piston, by heating the crown of the piston with an electric heating pad, so that heating is effected in very much the same way as later in the engine.

Since the working temperatures of different points of the piston are known from the tests with the fusible cones, it is only necessary to supply so much heat by the electric pad that these temperatures are reached. This can be done easily by placing the piston on an iron plate, in order to assure the same flow of heat as in service; in that case the highest temperature is attained by the crown of the piston, on which the iron plate rests. The temperatures of the piston skirt are lower and correspond closely to those under service conditions.

The test shows the current required to bring the temperatures of the piston crown and of the piston skirt to certain values in a definite time, and thus gives for the different piston materials (gray iron, aluminum, etc.) and for the different piston designs a good basis on which to judge the conductivity of the completed unit.

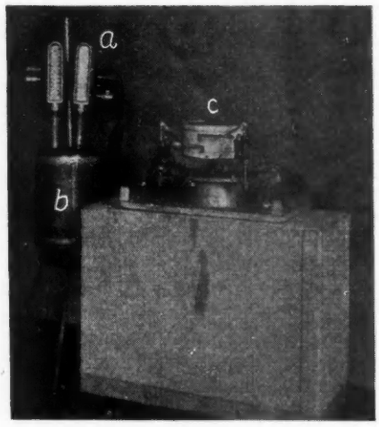



Fig. 3—Determination of the thermal conductivity of piston materials

Thermal Expansion.—The thermal expansion of piston materials is of great importance in connection with the determination of the clearance required between piston and cylinder wall. In determining thermal expansion coefficients, use is made of a quartz tube *b*, in which is inserted a specimen of 4 or 8 in. length of the material being investigated.

On top of the specimen is placed a quartz rod *c*. The specimen is then heated in an oil bath to the desired temperature, preferably 50, 100, 150 and 200 deg. C. The heat expansion is transferred from the quartz rod *c* to a minimeter (indicating micrometer) *d*. The temperature is read off accurately on the thermometer *a* and can be readily controlled by means of the gas flame.

In the case of this apparatus, too, an accuracy of plus or minus 1 per cent is sufficient for the requirements of the piston expert. Higher accuracy, which could be achieved only at extra cost, is of no importance in piston investigations, as in most cases the problem is to obtain comparative values.

Aside from the thermal expansion of the piston material, the expansion of the piston itself is of interest, and in the determination of this item it is the practice to heat the piston skirt (which determines the selection of the piston material) to the operating temperature. For this purpose use is made of a small measuring furnace with salt bath (Fig. 4). The piston is placed in the molten salt, which becomes quite fluid, and in the illustration a small portion of it can be seen at the center of the bath. The temperature of the bath is read off on the thermometer *b*, and a number of measuring points are marked on the piston, which are measured at the normal measuring temperature of 20 deg. C. (68 deg. Fahr.) and again at 50, 100 and 150 deg. C. The measuring point on the piston is transferred through a rod *d*, which is made of invar steel without heat expansion, to a minimeter dial gage.

The measuring apparatus is made insensible to temperature changes by being made of glass or invar steel, and therefore gives only the heat expansion of the piston itself. The values thus obtained serve to determine the heat expansion of any desired part of the piston.

It is true that measurement of the heat expansion in this manner does not correspond exactly to conditions of thermal expansion of the piston in service, for the reason that the piston crown becomes much hotter than the piston skirt. If it is desired to accurately determine the heat expansion of the piston in service, recourse is had again to the electric heating pad, and each point is brought up to its service temperature by means of a blast from an electric fan, after which the expansion measurement is made. In this way one obtains an excellent idea of possible out-of-roundness and differences in expansion along different outside diameters. Fig. 5 shows the arrangement which can be used also for the determination of thermal conductivity.

Hardness.—The piston slides back and forth over the cylinder wall under a certain pressure. Lubrication is not always the best; when the vehicle is first started the oil often is very viscous, and it takes some time before proper lubrication is effected. For this reason the hardness of the piston material plays an important part. It is measured with the ordinary Brinell press, in accordance with the standard procedure for light metal, viz., a load of 1000 kg., a ball of 10 mm. diameter, and 20 seconds duration. But it is impossible to conclude from the Brinell hardness at the normal temperature of 20 deg. C. (68 deg. Fahr.) whether the hardness of the material is sufficient for pistons. To reach a proper conclusion we have to base ourselves upon the temperatures of the piston crown, ring belt and skirt determined by the method illustrated in Fig. 2.

Fig. 5—Thermal expansion and thermal conductivity of the completed piston

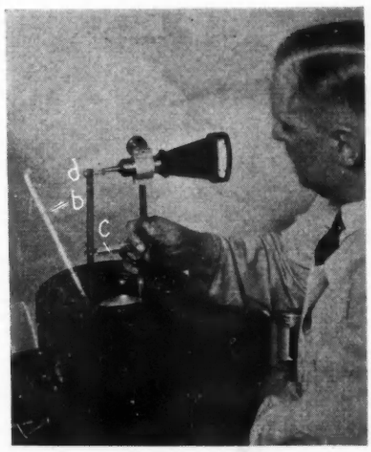



Fig. 4 — Measuring the thermal expansion of the finished piston at different temperatures in a measuring oven with salt bath

Fig. 6 shows how the piston is again introduced into the salt bath previously described. The crown of the piston is still barely visible at *b*, being almost covered by the molten salt. The bath is again brought up to temperatures of 50 deg., 100 deg., etc., up to 500 deg. C. Every time a new test temperature has been reached it is maintained for a certain time, and an impression in the crown of the piston is made with the Brinell ball *a*. Only in this way is it possible to obtain reliable information concerning the behavior of the piston crown, ring belt and piston skirt in service.

In measuring the Brinell hardness it is advisable not to depend on a single observation, as very much depends upon how long the work piece is maintained at the test temperatures. For instance, if the specimen is maintained at the testing temperature for only one minute, the hardness reading is entirely different from that obtained after the temperature has been maintained for several hours.

Aside from this, every successive observation gives a lower value, similar to the hysteresis loop in electrical work, until finally after prolonged annealing a definite value is obtained. In this case, again, one takes the temperatures which have been determined under operating conditions, and the piston or specimen is maintained at this maximum temperature for several

hours. It has been found in practice that pistons which showed a high Brinell hardness when assembled into the engine anneal on the crown, where they are constantly exposed to high temperatures, and decrease considerably in Brinell hardness. This applies particularly to alloys whose Brinell hardness has been boosted by a preliminary heat treatment.

Wear Resistance.—Two parts sliding over each other are subjected to a certain degree of wear which depends in the first place upon the conditions of lubrication and also on the surface conditions of the moving parts. The best plan is to measure the wear in the automobile engine itself, and such measurements are currently carried out. The automobile is run, say, 50,000 km. (31,000 miles) and after each 10,000 km. (6220 miles) the wear of the cylinder, piston skirt, ring grooves and rings is measured. This process is rather expensive and takes much time.

Aside from this, if two cars with different types of pistons, or pistons of different materials, have been running the same distance, it is still impossible to draw conclusions of general applicability, because it is not known whether operating conditions were the same in both cases. In order to eliminate the many variables, a wear-testing machine (Fig. 7) has been built, in which the variables can be controlled at will.

This machine was developed in collaboration with the Aaachen (Aix la Chapelle) Technical College (Privy Councillor Wallichs), after a small sample machine had been built first. The Aachen Technical College carried out an elaborate series of tests on the wear of cylinders materials for the German Automobile Manufacturers Association. Specimens are run against gray iron rings cut out of cylinders. Thus the tests are made not on gray iron rings specially cast for the wear test, but on test specimens cut from the complete casting. Ten such rings are mounted on a shaft. The shaft itself is driven at any speed desired through a variable-speed d.c. motor, mostly between 1000 and 3000 r.p.m.

With a specimen diameter of 4 in., this gives rubbing velocities up to 2000 ft. per min., which obtain in modern engine practice. The oil in the housing is heated by means of an electric heater to any desired temperature between 40 and 140 deg. C.; temperatures are read off on a thermometer and the housing has a vent.

Fig. 8 shows the arrangement of the test specimens more accurately, these being cut from piston crowns, that is, directly from the working part. They operate in a long guide sleeve and are prevented from rotating therein by a nose *f*. As shown in Fig. 7, the specimens are loaded by a weight through a lever; a specific loading of 10 kg. p. sq. cm. (142 lb. p. sq. in.) was chosen.

This loading also corresponds approximately to the loading of the piston skirt by the side pressure, and in this connection it must be considered that in this case, too, the loading at the beginning of operation is practically infinite, as, owing to irregularities in the finish of the cylinder bore and piston surface, there is at first only line contact. If it is desired to duplicate difficult lubrication conditions, such as are met in automobile engines, this can be readily done by the use of a poor grade of oil, increase in the oil temperature, contamination of the oil with emery, use of oil taken from the crankcase of an engine that has run on it for

*(Turn to page 540, please)*

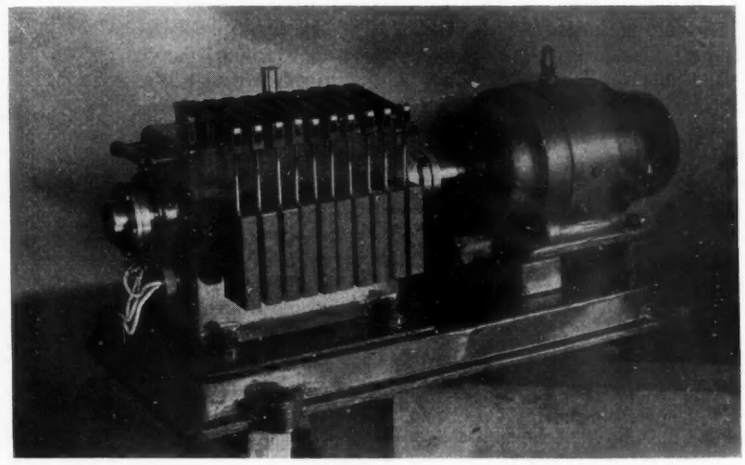


Fig. 7—Machine built specially for wear tests on pistons and cylinder

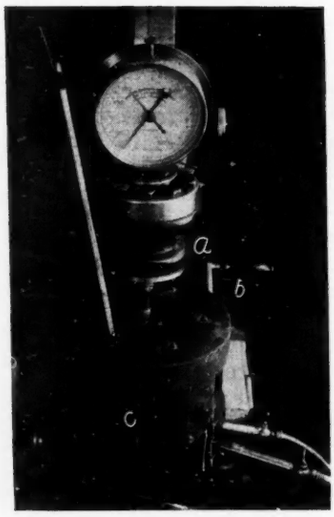



Fig. 6 — (Left) Hardness test at higher temperatures

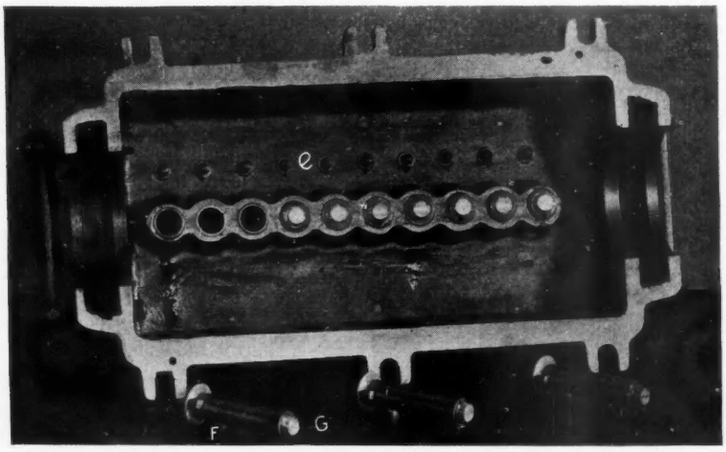



Fig. 8 — (Right) Inside view of cover of wear-testing machine with specimens

# PRODUCTION LINES

## Resultful Salvage

One steel wheel maker, whose name must not be mentioned, got hold recently of a very profitable idea. Some special rail-car axles of high-grade 1045 carbon steel were rejected because they were undersize in length. This wheel maker bought a batch of them and now they're running around as truck wheels. The way it works out is that each shaft (of square section) is cut into four billets, each producing enough stock for a wheel.

## Do You Stamp It?

A little treatise on press work has just come out. In a brief space, the author has compressed a lot of handbook stuff pertaining to strength of materials and design. Several pages are devoted to tables giving diameters of blanks for shells. Another section discusses the elements of design favoring low stamping cost. If interested, write for "Metals—Stamped and Pressed," by the Geometric Stamping Co. No charge.

## Calling Them Names

We've reached a serious state of affairs. Recently the A.S.A. sent out a questionnaire to a lot of experts asking them to indicate the name they give to some of the most commonly used lathe tools. What a response! One poor tool called a "right-hand straight turning tool" by one owner had been christened "left-hand straight roughing tool" by another. And many more. The upshot of it is that the A.S.A. has organized a new committee whose job will be to provide small tools with standard names. It has all the earmarks of a mighty wise project —and a practical one.

## Out of the Trenches

Cast-iron camshafts and crankshafts for production engines seemingly are 'way past the speculative or rumor stage. Certain people specializing in electric-furnace gray irons say they can produce these parts satisfactorily. Physical characteristics are said to be quite adequate. We think we are rapidly approaching a story.

## Money for an Idea

A leaky bus roof and an accommodating fellow-traveler produced this tip. It seems that certain double-deck buses are troubled with chronic roof leaks, probably due to the creaking and weaving of the old joints. Many bright ideas have been worn out in an effort to design a joint flexible enough to weave with the structure. How about you, prolific inventors? There's a reward out for the right answer.

## Old Turnings

C. M. Spencer is credited by Prof. Joseph W. Roe with being the first to introduce automaticity in the operation of the turret lathe. For at least 20 years turret lathes had depended upon the control of the operator. Then along came Spencer and embodied the functions of the operator in a camshaft parallel to the axis of the lathe. This carried cams controlling the turret, cross slide, and the feeding of the bar stop. Believe it or not, the value of the patents on this basic idea was lost because the patent solicitor failed to grasp the significance of the adjustable strips on the camshaft, and did not cover them in his claims.

## Synthetic

A newcomer in the field of synthetic chemistry is "Thiokol"—a rubber substitute. It is said to be unaffected by gasoline, benzol, drip oil and other active organic solvents. The people making this material will be glad to send samples.

## Bakeliting

One of the recent applications of Bakelite, that universal material, is on laminated running boards. A very distinctive one graces the Reo-Royale.

## Nevastain RA Steel

Research work by the Ludlum Steel Co. has led to the development of a new stainless steel known as Nevastain RA, claimed to eliminate the fabricating difficulties experienced in the past. The new steel is being marketed by Associated Alloy Steel Co.

Nevastain RA is an alloy steel containing chromium, copper, silicon and iron. It does not work-harden to the same extent as other corrosion-resistant alloys and therefore will cold-roll, draw, upset and form more readily. This means greater production and increased die life.

Nevastain, it is claimed, can be rendered completely ductile at normal annealing temperatures. It responds to heat treatment, is free machining and can be sheared, punched, perforated, sawed and drilled by ordinary methods. The steel can be gas- or electric arc, flash- or spot-welded without the tendency to grain growth shown in straight chromium steels.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

# Chromium Plating on Zinc Alloys Should

**If this standard is adhered to as a minimum, parts can be obtained with brightness and wear-life equalling that of other base-metals**

by E. A. Anderson*
and C. E. Reinhard*

DURING the past few years it has become common practice to chromium plate a large number of exposed parts on the automobile.

The ability to take a satisfactory plated coating is only one of the requirements imposed by the automotive engineer on metals and alloys for such use. He also requires sufficient mechanical strength and a low cost.

Zinc has not lagged behind in development. Strong, tough rolled zinc alloys have been made available. Outstanding improvements have been made in the toughness and stability of zinc alloy die castings again within the past year.

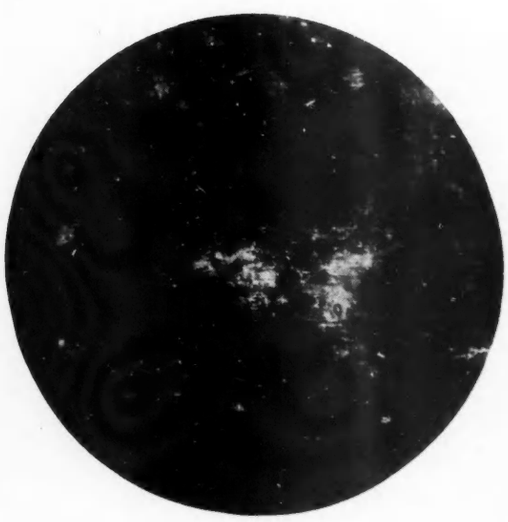
It is of more than passing significance that, despite all these improvements, zinc remains the cheapest nonferrous metal. This may be demonstrated by computations of the purchasing power of $1,000 on the basis of typical market quotations.

There is no difficulty today in obtaining zinc and zinc alloys with physical properties adequate for practically all of the parts now finished in chromium plate. This statement should not be construed to mean that zinc alloys are not strong enough for other unplated parts of the car. On the contrary, the modern stable zinc alloys are surprisingly strong and tough. Tensile strengths ranging from 35,000 to 50,000 lb. per sq. in. are combined with impact values on ¼ in. by ¼ in. specimens, ranging as high as 20 ft.-lb. In certain alloys complete retention of ductility and toughness has been achieved.

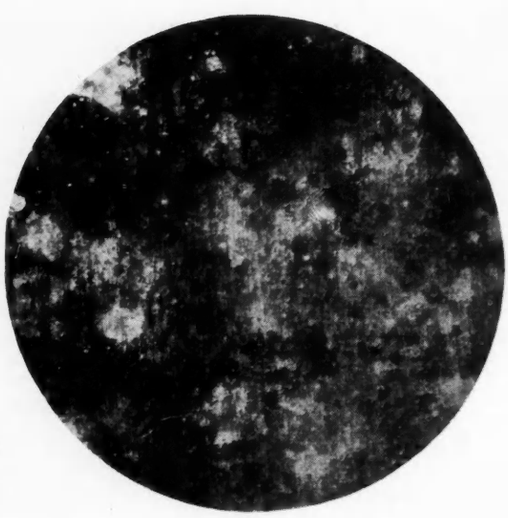
The present article is restricted to those uses of zinc in which chromium or nickel plating is involved. Among these uses may be listed radiator caps, radiator moldings, cowl moldings, running board moldings, battery covers, door handles, tail lamp brackets, windshield frames and brackets, head and tail lamp shells and rims, trunk rack moldings, metal tire covers, rear-view mirror brackets, emblem bars, instrument board panels and frames, scuff plates, dome lamp rims and switch escutcheons, rear window frames, window guides, gasoline tank caps, hub caps, tire locks, ignition locks, window regulators, door pulls, accelerator pedals, robe rail and foot rail brackets, windshield adjustment brackets, seat adjustment handles, etc.

There is no longer any question that zinc and its alloys can be plated with adherent coatings of luster and appearance equal in quality to those applied over

* Research Division, The New Jersey Zinc Co.



Rolled zinc plated with 0.0001 in. Ni + 0.00002 in. Cr 6X



Rolled zinc plated with 0.00005 in. Ni + 0.00002 in. Cr 6X

# Have 0.0003 in. Thickness

the other common metals. Information on the best commercial procedures has been made available by the New Jersey Zinc Co. and by others.

The situation with regard to the durability of plated coatings is not so clearly defined. Nickel-chromium coatings of satisfactory durability can readily be plated on zinc and its alloys, and coatings of this sort are obtainable today. On the other hand, it must be admitted that coatings of inferior quality are prevalent. This situation is not confined to zinc alone, but may be noted with all of the other plated metals.

The writers are of the opinion that the responsibility for these inferior coatings devolves upon the purchaser. Coatings of lasting quality can be obtained if and when the purchaser sets up and enforces a reasonable specification and allows the plater a price at which he can afford to follow the specification.

Zinc, like all other metals, requires a reasonable thickness of coating to prevent or retard the access of rain water and dew to the base metal. For any required exposure period there will be a minimum thickness below which unsatisfactory durability will be obtained.

There is only one possible way to obtain quality plating, and that is, by setting up and enforcing adequate specifications. The plater can hardly be blamed if he shades his price and his quality to meet competition when he knows his work is not checked.

There are in existence today some specifications for the thickness of plated deposits on rolled zinc and zinc die castings. In most cases these call for a nominal thickness of 0.0002 in. or less of coating. This is not quite thick enough to give good protection.

The first step in the development of a specification is, of course, the selection of a limiting value for the minimum thickness of coating which will give satisfactory protection and at the same time will not de-

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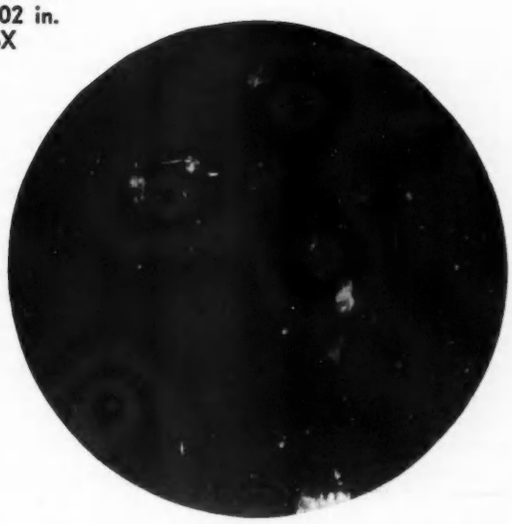
Rolled zinc plated with 0.0005 in. Ni + 0.00002 in. Cr 6X

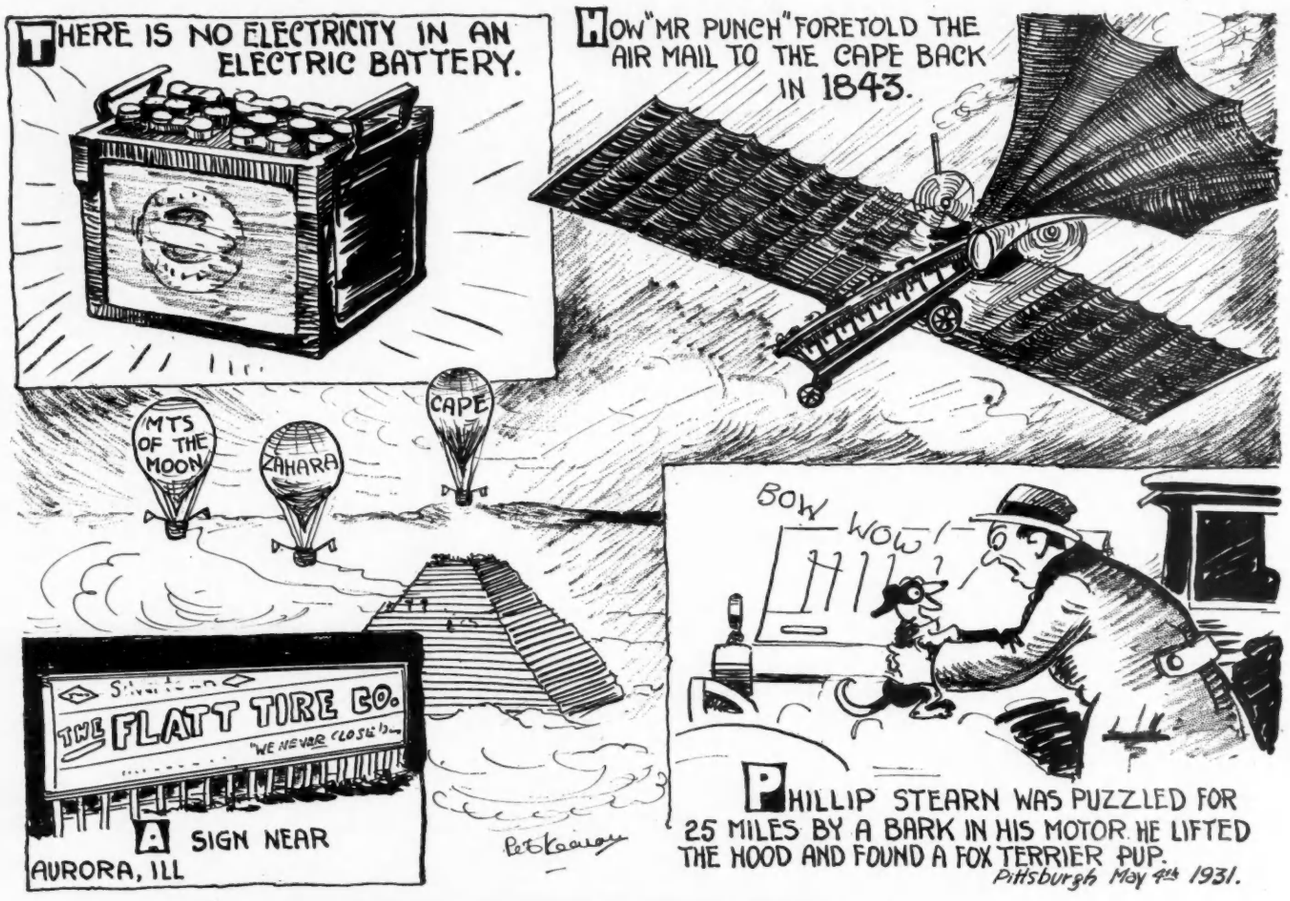
Rolled zinc plated with 0.0003 in. Ni + 0.00002 in. Cr 6X

Left—Rolled zinc plated with 0.00015 in. Ni + 0.00002 in. Cr 6X



Above—Rolled zinc plated with 0.0002 in. Ni + 0.00002 in. Cr 6X

# Automotive Oddities—By Pete Keenan


THERE IS NO ELECTRICITY IN AN ELECTRIC BATTERY.
HOW "MR PUNCH" FORETOLD THE AIR MAIL TO THE CAPE BACK IN 1843.
MTS OF THE MOON
ZAHARA
CAPE
THE FLATT TIRE CO.
"WE NEVER CLOSE"
A SIGN NEAR AURORA, ILL
BOW WOW!
PHILLIP STEARN WAS PUZZLED FOR 25 MILES BY A BARK IN HIS MOTOR. HE LIFTED THE HOOD AND FOUND A FOX TERRIER PUP.
Pittsburgh May 4th 1931.

## The News Trailer

**Some Ford Angles.** Almost as soon as it became definitely known that Ford dealers and a limited number of their retail salesmen would be invited to a pre-view of the new cars at the various assembling and distribution points, the extent of public interest in the new cars was proved by the upspringing of a new and attenuated racket. A journalist (we use this term so as to drag in others than the dailyraggers) has been defined as a gentleman who knows more about angles than Euclid. Some of those Ford fellows found a few angles themselves. When we heard about it, tickets for the pre-view of the Ford car were being offered at dollars seven-fifty each, on a whenasif issued basis, by the salesmen who were expecting to get them. As one salesman expressed it, "I'll have plenty of chance to see that car after it gets on the floor. If I go to the preview and dinner it will cost me money. If I sell a few tickets I can make a few extra dollars."

**With the assistance** of the telegraph companies the Ford Motor Co. indulged in some artificially created suspense on Wednesday, March 30. Around 5 o'clock in the evening Ford dealers all over the U. S. received telegrams telling them to remain in their places of business until prices on the new cars were received by wire. Many dealers had already hopefully cleared their sales floors to receive new models. Then, like bootless knights of old, the dealers began their vigil. Six o'clock, 7, 8 . . . the long hours ticked. About 9 o'clock morning newspapers got prices by telegraph for insertion in previously prepared copy. Some first editions went to bed without the prices, some without the advertisement. Dealers got prices about the same time as the newspapers.

**Some smart guessing** by G. P. Putnam's Sons, the publishers, brought out a book on Henry Ford Friday, March 25, less than one week before the official announcement of Model 18 (the new eight) and Model B (the improved four). The book is called "The Tragedy of Henry Ford," and is by Jonathan Norton Leonard. Built around the thesis that Mr. Ford has been a failure at everything but mass production, the book proves its thesis verbatim, but not seriatim, to your commentator. The Selden case is entirely neglected, for example, and though opinions may differ as to what that proves, it happens to be the one perfectly documented episode of Mr. Ford's life. The episodes selected by Mr. Leonard to illustrate his point are those episodes which illustrate his point. They are handled with fair sanity, colored, but not overcolored; but they are not the whole story, and the book suffers by failing to give the sources for many statements which are interesting, true or not, but important only if true.—H.H.

# NEWS

## B. O. P. Sales Co. Organization Set

### Method of Operation Explained by Grant and Blees for Press

A virtual duplication of the present highly successful Chevrolet regional and zone set-up as far as personnel and method of operation are concerned—this briefly describes the field sales organization of the newly formed Buick-Olds-Pontiac Sales Co., of which Richard H. Grant, vice-president in charge of sales, is the active head, and W. A. Blees is general sales manager.

While complete details are not as yet available, it can be stated that the set-up generally in a zone office will include a zone manager, assistant zone manager, car distributor, service manager, sales promotion manager, accounting manager, field sales representatives, service representatives to shoot trouble and adjust complaints, and mechanical school instructors. In addition, in multiple dealer cities there probably will be found a city sales manager, and at some points also dealer organization managers. The major point of difference will be that in the new organization there will be a greater number of technical men, in view of the multiplicity of lines.

The functions of the various individuals, it will be noted, are highly specialized in character, a move made possible by the merging of the sales activities of the three units. With a potential of approximately 350,000 cars and with a dealer organization of approximately 6500 such a move is possible, where the individual units themselves would not have been able to economically sustain such a group of specialists.

Sales of parts and accessories, as well as cars for these three units, are centralized in the new organization. The service organization in the home office is under the direct supervision of A. H. Bartsch, general service manager, who comes to this post from Mr. Grant's central General Motors sales and service advisory staff. Under Mr. Bartsch's supervision there will be a combination and expansion of regional and zone warehouse facilities, similar in scope to that involved on a smaller scale recently in Southeastern States. There will be a total of 4 regional and approximately 30 zone offices. Parts and accessories for the three units will be handled as formerly, dealers ordering directly from their zone warehouses, where adequate stocks will be maintained. It is obvious, of course, that the amalgamation of the sales activities of the three units will result in better parts distribution facilities since the new corporation will be able to afford the establishment and maintenance of more parts depots than was the case for each unit separately.

The set-up makes possible the transference also of service helps to dealers from factories to field offices, where they are more readily available to the dealer. The work will be supervised by the home office of the new company but the individual units will have technical service men at the home office rather than individual service managers, to provide all individual factory assistance possible without conflicting with the more direct functioning of the specialized field staffs.

A further beneficial result of the combined handling of service parts and accessories should be the eventual elimination of separate parts numbers and possible differences in prices on such car parts as are interchangeable on two or more units. It is obvious, of course, that no two cars

*(Turn to page 534, please)*

## Packard Reports Loss

DETROIT, March 29—Packard Motor Car Co. has reported net loss of $2,909,117 after all charges for year ended Dec. 31, 1931, compared with net profit in the previous year of $9,034,220.

## Auburn Prices Up

AUBURN, IND., April 2—Prices on all models of the Auburn line will be increased $100, effective April 15, according to N. E. McDarby, vice-president in charge of sales.

## Chevrolet Prices Cut; Roadster Under Ford 8

DETROIT, March 31—In announcing this afternoon reductions of $15 to $55 on every type of Chevrolet passenger car effective April 1, W. S. Knudsen, president of Chevrolet, asserted that the company would continue to build six-cylinder cars as its only type for an indefinite period. New prices of the Chevrolet follow:

| Model | New Prices |
|---|---|
| Roadster | $445 |
| Sport Roadster | 485 |
| Phaeton | 495 |
| Standard Coupe | 490 |
| Sports Coupe | 535 |
| DeLuxe Coupe | 510 |
| Coach | 495 |
| DeLuxe Coach | 515 |
| Standard Sedan | 590 |
| Sports Sedan | 615 |
| 5-Pass. Coupe | 575 |
| Cabriolet | 595 |
| Landeau Phaeton | 625 |

## Car Tax Snare Drawn Tighter

### House in Committee Railroads Excise Levy on its Way

### by L. W. Moffett

WASHINGTON, March 31—Operating under a ruthless gag rule that crushed all opposition, the House of Representatives last Tuesday slapped selective taxes on the automotive industry. The taxes were imposed in the revenue bill of 1932 and are 3 per cent on passenger cars, 2 per cent on trucks and 1 per cent on parts, tires and accessories. They are proposed to be fixed on wholesale prices. It is estimated by the Ways and Means Committee that they will raise $57,000,000 in revenue, based on 1931 production. Broken down the estimates are: Passenger cars, $45,000,000; trucks, $4,000,000; parts, etc., $8,000,000. The original Treasury recommendations, which the committee rejected after vigorous protests from the industry, were 5 per cent on passenger cars, 3 per cent on trucks and 2½ per cent on parts, tires and accessories, and were estimated to raise $75,357,000. The subsequent Treasury proposal of a 1 cent a gallon tax on gasoline was estimated to raise $165,000,-

*(Turn to page 532, please)*

# Excise Taxes Loom as Michigan Delegation Loses Fight

*(Continued from page 531)*

000 and it was likewise rejected by the committee. It has retained the proposed 4 cents a gallon tax on lubricating oil, estimated to raise $25,000,000.

The proposed taxes on trucks and passenger cars are $82,000,000. The Treasury automotive and gasoline proposals totaled $267,357,000. So there is a difference of $185,357,000, a huge total in savings.

But it is not simply the taxes themselves that have riled the automotive industry. It does object to the high taxes themselves. But it is especially angered at being made the football of politics. The taxes are of course another example of discriminatory legislation of the rankest sort. The industry had hoped that it had settled once and for all time the question as to whether it was to be picked out and assessed special penalties merely to gratify the itch of self-seeking politicians.

It received the jolt given it with a determination to fight and fight with its whole might. No sooner had the amendment been jammed through than the industry stripped for action. Wires went out to dealers all over the country to protest and protest with vigor to their representatives in Washington against the discriminatory legislation. More than that, farm organizations again renewed their attack on the motor excise taxes, as they have done before. And farm votes on the eve of a campaign are things that make members of Congress stop, look and listen—and often change their votes. The backfire from their action came pouring in by telegraph soon after the vote was taken and caused something of an eruption among those who threw fairness to the winds and let politics hold full sway as they supported the taxes. Dealers, at the behest of the National Automobile Chamber of Commerce, likewise made it known in no uncertain terms how they felt and demanded revocation of the vote.

Sturdy supporters in the House, futile in the face of the steam roller methods, served notice that they would demand a record vote on the automotive tax amendment when the bill is put before the House for final passage after coming from the committee of the whole which passes upon amendments. The Michigan delegation to a man rose against the amendment when a division vote was taken. But it was adopted by a large majority. There were many who stood up in favor of the amendment who in the past have gone on record against selective taxes directed at the automotive industries. This gave the impression that since the vote was taken by the committee of the whole these representatives and others merely went through the form of voting to speed the bill to final vote. It was the hope that many who took this position will return to the fold and vote against the amendment when the bill is put on its final passage.

The rigidity of the rules under which the House voted on amendments, speeding one after another, is shown by the fact that the committee ran out of textual matter on one occasion and the Ways and Means Committee had to dump in more amendments. Further evidence of the czarist methods is made plain when it is explained that but 10 minutes was allowed for discussion of the amendment carrying the automotive taxes, as well as a hodge-podge of other taxes, all rolled into one. Chewing gum, jewelry, radios, sporting goods, candy, cosmetics, furs, motor boats and yachts all were mixed in with automobiles, trucks, parts, tires and accessories to make this legislative melange. The politics oozed out of it. For the implication was clear that automobiles, trucks, tires, etc., are luxuries. The hoary idea that automobiles are in that class still goes over, despite the fact that 26,000,000 people own these "luxuries." The delusion is being dissipated but the fringe still hangs on. The fact that the automobile is a thing of absolute necessity and utility, and like the truck, a means of livelihood for millions of motorists, farmers, and others is percolating even the heads of members of Congress, however. And this will be stressed to the Senate Committee on Finance when it takes up the tax bill. It is confidently believed that the Senate Committee will alter the House bill greatly, if not tear out practically everything which follows the enacting clause.

The only members of the House who had a chance to speak out against the automotive taxes were Representative Clancy of Detroit and Representative Michener of Adrian, Mich. They went down fighting. But their voices were as voices in the wildness—and that is no typographical error.

Both not only pointed out the utter inequity of the taxes, but emphasized the fact that they were being proposed precisely on the eve of the automotive industry's effort to stimulate employment and industry generally. New models, it was stated, are about to come out and general exhibits are scheduled for the immediate future. Unsurpassed values are to be offered purchasers. These efforts, if proving successful, will obviously stimulate the automotive industry, one of the greatest manufacturing industries of the country, and with it the many industries which it feeds liberally in the way of desperately needed markets for tonnages, supplies and equipment. It follows that this would mean large employment and turn the wheels out of the rut of depression into the smooth road of better times. But with a tax slammed on the industry, inevitably meaning higher prices of cars, just at a time when prices had been cut for many models, the machine is stalled.

The House turned to these iniquitous excise levies after it went Bolshevik and overwhelmingly voted down the manufacturers' sales tax, turning viciously on leaders and running madly into a chaotic situation that forced the committee to turn to new amendments. The general sales tax, something new for the United States, was accepted by all industries as being fair and they stood ready to share in its responsibility. The estimated sales tax for the automotive industry was $26,000,000. But more important, it was non-discriminatory.

Representative Clancy, after protesting against the dscriminatory automotive taxes, called attention to efforts of automotive leaders to stimulate industries and employment of the country and said that they are actually staking fortunes in their efforts to start prosperity. He served notice that a record vote on the taxes would be demanded when the bill is brought up for final passage.

The added amendments bring the estimated revenue up to $1,293,000,000. This, Acting Chairman Crisp of the Ways and Means Committee estimates, is $50,000,000 more than is required to balance the budget, the end so eagerly sought.

Representative Clancy suggested that the surplus $50,000,000 be lopped off the automotive industry by eliminating the proposed taxes. But his plea went for naught. The juggernaut was under way and was not to be stopped. It bowled over everything in its path. The rules of what used to be called "Cannonism" were mild in comparison with those set up by forces in charge of the bill. No one except members of the Ways and Means Committee was allowed even to see amendments which were quickly drafted on Monday night and introduced in the House at Tuesday noon. The amendment carrying the automotive taxes was dumped into the House and passed within the space of an hour. It was a sight-unseen proposition with those who so vainly fought against it.

## Perfex Elects Tetzlaff

F. E. Tetzlaff, purchasing agent, Perfex Corp., makers of automobile and industrial engine radiators, has been elected secretary and treasurer, succeeding John W. Tambert, who has been placed in general charge of the recently created division of heating apparatus. Mr. Tetzlaff will continue in charge of purchasing.

# Kittredge Dies; Headed Peerless

## Was Secretary and President of Early Industrial Bodies

Lewis H. Kittredge, for many years president of the Peerless Motor Car Co., shot and killed himself at his home in Cleveland on March 28. He was 61 years old.

Lewis Harris Kittredge joined the Peerless Manufacturing Co. in 1897 as shipping clerk. The company started upon the manufacture of motor vehicles in 1900, when it brought out an American version of the De Dion motorette which had been developed in France and marketed there for several years. It was of the so-called cyclecar type and was equipped with a single-cylinder, vertical De Dion engine of 2¾ hp., with an air-cooled cylinder and a water-cooled head.

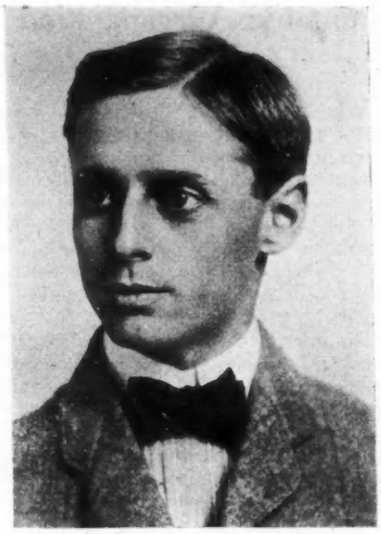
This car, naturally, was not well-suited to American roads of that period, owing to its small, bicycle-type wheels and its low power, and during the following year work was begun on the development of a four-cylinder car with engine under a hood in front and with rear-entrance tonneau body. This car, which was the work of Lewis P. Mooers, was of advanced, high-class design, and its success soon placed the Peerless company among the leaders in the American industry.

In 1902 the company was incorporated as the Peerless Motor Car Co. with a capital stock of $300,000, Mr. Kittredge becoming secretary. Not long after, he was promoted to the position of vice-president and treasurer, and in 1905 he became president, which office he retained until 1921.

Under Mr. Kittredge's direction the Peerless Motor Car Co. became one of the leaders in the high-grade car field, Packard, Pierce, Peerless and Locomobile then being sometimes referred to as the "big four." In 1903 the company built a racer to carry the American colors in the Gordon Bennett international race which was that year held in Ireland. It was driven in the race by its designer, Lewis Mooers, but did not succeed in bringing the cup to America.

In the early years of the industry in this country Mr. Kittredge, as president of the Peerless company, took a prominent part in the activities of the various organizations of the industry. He was secretary of the Association of Licensed Automobile Manufacturers from 1904 to 1910, or practically throughout the life of that organization, while he served the National Association of Automobile Manufacturers, which represented the whole of the industry, in various capacities, winding up as its president in 1910.

About 1911 the Peerless company entered the commercial vehicle field and developed a complete line of trucks. Its heavier trucks met with exceptional success and were ordered in large numbers by the allied governments during the war. The expansion of the company into the commercial vehicle field and the disturbances of the passenger-car market during and immediately following the war led to a number of reorganizations, and the Peerless company came under the control of banking interests. The manufacture of trucks was discontinued after the war, and an eight-cylinder, five-passenger car was developed for the post-war market. As already mentioned, Mr. Kittredge's connection with the Peerless company in an executive position terminated in 1921.



Lewis H. Kittredge

## Chamber Speeds Up Fight Against Tax

NEW YORK, March 29—The National Automobile Chamber of Commerce today sent out telegrams to all its members and to all other automotive groups, urging them to protest immediately to their respective Congressmen against the latest proposed measure for special taxes on automobiles and automotive products. The new proposal, which was reported out by a special sub-committee and approved by the House acting as a committee of the whole, would place a three per cent tax on automobiles, two per cent on motor trucks and one per cent on accessories.

The Chamber is carrying on its opposition to this proposal on the grounds that it is discriminatory and places an inequitable burden on a product which is essential to modern economic existence, and which should be a leader in the road to economic recovery unless deterred by such discriminatory taxes. It continues its protestations that this industry is willing to bear its fair share of any load that may be necessary, but as an industry which already bears an unusually large part of the tax burden, it will protest to the last ditch any such effort to single it out for a lion's portion of the additional load necessary at this time.

The Chamber has for the last week been bombarding Congressmen with broadsides of literature quoting editorials from newspapers all over the country urging that this industry not be discriminated against in any tax measures that Congress may take.

## Buick Closes Branch

MILWAUKEE, March 29 — Reports that the Buick Motor Co. will close its factory branch here on or about April 1 have been confirmed by officials following a meeting at the Chicago branch yesterday. Thereafter the Chicago branch will supply southern Wisconsin dealers; the northwestern Wisconsin territory will be handled from the Minneapolis-St. Paul branch, and the northeastern Wisconsin territory through the Saginaw, Mich., branch. The distribution reapportionment is being made as a matter of cost economy, according to S. S. Lindsey, Chicago branch manager. However, the Federal court ruling last fall by which the Milwaukee branch was required to pay approximately $250,000 in Wisconsin income taxes is believed to have an important bearing on the change.

## Hayes Reelects Hoagland

W. W. Hoagland was reelected president of Hayes Body Corp. at the annual meeting of the directors held last week. E. J. Connelly was elected vice-president, R. O. Gill named secretary, and A. A. Anderson treasurer and assistant secretary.

These men and W. J. Johnson and Walter J. Curley, both of Pittsburgh, and McKee Robinson of Detroit, constitute the complete directorate. Anderson and Curley are new members.

O. W. Birnie was elected comptroller and assistant treasurer.

Orders from present Hayes Body customers and early prospects of new customers in the immediate future indicate a profitable year in 1932.

## Institute Elects Fowler

Sir Henry Fowler, since 1925, chief engineer of the L. M. S. Railway of Great Britain and a former president of the Institution of Automobile Engineers, has been elected president for 1932 of the Institute of Metals.

## Dodge Truck Deliveries Up

DETROIT, March 28 — Dodge truck deliveries for the week ending Feb. 27 were 29.2 per cent ahead of the previous week, and for the week ending March 5 showed 20.5 per cent increase.

## Business in Brief

**Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries**

NEW YORK, March 30—Retail sales in some parts of the East and the West were helped by more favorable weather conditions last week; but in all sections wholesale and jobbing lines were, at best, only fair. The controversy in Congress regarding the tax question has added some uncertainty to the optimism in business quarters. The Guaranty Trust Company's index of business activity for February stood at 56.4, as against 55.9 for the preceding month and 71.7 a year ago.

### DEPARTMENT STORE SALES

Department store sales in the metropolitan area of New York during the first 12 business days of March, according to the Federal Reserve Bank of New York, were 22.1 per cent below those a year ago.

### CAR LOADINGS

Railway freight loadings during the week ended March 12 totaled 575,481 cars, which is the highest level for any week so far this year. Railway freight loadings during that week were 158,099 cars below those a year ago and 305,827 cars below those two years ago.

### LIFE INSURANCE SALES

Sales of ordinary life insurance during February failed to sustain the gradual improvement in the few months preceding and were 8 per cent below those a year ago. Practically every section of the country shared in this decline.

### COTTON SPINNING

According to preliminary figures, there were 32,232,310 cotton spinning spindles in place in the United States at the end of February, of which 25,189,748 were operated some time during the month, as against 25,013,750 during the preceding month and 25,798,034 a year ago.

### CRUDE OIL OUTPUT

Average daily crude oil production for the week ended March 19 amounted to 2,157,200 bbl., as against 2,145,600 bbl. for the preceding week and 2,268,050 bbl. a year ago.

### FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended March 26 stood at 63.1, as against 63.1 the week before and 63.3 two weeks before.

### BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended March 23 were 26 per cent below those a year ago.

### STOCK MARKET

The stock market last week was dull, with the trend slightly downward. The defeat of the sales tax and the proposed high rates on incomes and estates were a depressing influence. The volume of trading was light and only on one day were transactions above 1,000,000 shares. The grain markets were weak, and copper and rubber prices reached new low levels.

### RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended March 23 showed decreases of $24,000,000 in holdings of bills bought in the open market and of $7,000,000 in holdings of Government securities. Holdings of discounted bills increased $5,000,000. The reserve ratio on March 23 stood at 70.6 per cent, as against 70.0 per cent a week earlier and 68.8 per cent two weeks earlier.

## Tentative Organization of B. O. P. Sales Described

*(Continued from page 531)*

are built anywhere which do not have some parts in common, even if only certain types of bearings, etc. Mr. Grant is authority for the statement that the new company will endeavor as rapidly as possible to give the dealer the benefit of simplification possible in this direction. It could hardly be expected, of course, that this could be achieved overnight.

As far as the Southeast and Northwest Sales companies are concerned, these units will be merged into the new company. In their respective territories, therefore, the merchandising of Cadillac parts and accessories as well as cars will also come under the control of the new company in these territories. In the case of the Northwest company, in the sparsely settled Montana area, the Buick-Olds-Pontiac Sales Co. will also control the merchandising of cars, parts, and accessories for Chevrolet and General Motors Truck.

Plans do not contemplate the inclusion of these three units in the activities of the new company at any other points. No changes have been made in policies relating to resale of parts to independent repair shops, etc. This will continue as formerly in the hands of the individual dealers, according to such information as is available.

Definite dates have not been scheduled as yet for the individual dealer meetings, at which the functioning of the new company will be discussed with the dealers involved. It is known however that these will begin Monday, April 11, and extend over a period of ten days or two weeks. This date has been picked so as not to interfere with the present activities of dealers in connection with the General Motors Spring Showing, being held April 2 to April 9.

In the meantime Mr. Grant has briefly outlined the policies of the new company with respect to possible combination of dealers, etc.

"It will be our policy," Mr. Grant says, "to have exclusive Buick, Oldsmobile and Pontiac dealerships in just as many instances as possible. As there is a much higher potential for sales of all cars in big cities than in smaller ones, we can state, as a generality, that we will probably carry exclusive accounts at key point towns and make combinations in smaller places where desirable. There will be no hard and fast rules covering this subject and each city and each dealership will have to be analyzed in an individual way."

Continuing, Mr. Grant said: "Possibly a good way to explain the situation would be to say that we will carry on as we have in the past, with the exceptio to all parties concerned to make comtion that when it becomes of interest binations, we will have the flexibility to do so without delay."

The main point in making combinations, Mr. Grant said, was to enable the dealer to make more money. "In planning our dealer representation," he pointed out, "it will be our aim to plan our franchises on the best money-making basis that we can devise, taking the individual territory, the personality and the financial strength of the individual dealer into consideration."

For General Motors Dealers, Mr. Grant has this additional and pointed message: "Where we now have dual dealerships, or at such points as we may create them in the future—when everyone's equities have been given consideration—I should like to point out to you that such dealers will be working under the direction of one management and in this way we should avoid the confusion that naturally comes up when a dealer is contacted with by more than one organization."

## Oakland Personnel Changes

DETROIT, March 29—With his taking over manufacturing control of the Oakland Motor Car Co., Pontiac, William S. Knudsen has announced a number of important personnel changes.

At Pontiac F. O. Tanner is now general factory manager; P. H. MacGregor, general superintendent, and H. J. Schmidt, accountant. Mr. Tanner was formerly assistant factory manager of Chevrolet in charge of Flint, Saginaw and Bay City operations. Mr. MacGregor was plant manager for Chevrolet at Flint and Mr. Schmidt was accountant for Chevrolet.

Succeeding Mr. Tanner is Arnold Lenz, formerly manager of the Saginaw foundry. William Notman, formerly general superintendent of the motor division, succeeds Mr. MacGregor as Flint plant manager.

Succeeding Mr. Lenz as plant manager at Saginaw is James Miller, formerly foundry superintendent at Saginaw, while William Scott, formerly night superintendent, succeeds Mr. Notman as general superintendent of the motor division.

Hugh Dean, Chevrolet plant manager at Detroit, becomes assistant manufacturing manager in charge of the Detroit and Toledo operations.

Further changes include the moving to the Buick plant at Flint of C. B. Stiffler, who remains in his new capacity, assistant to I. J. Reuter, now general manager of Buick and Olds.

C. T. Christopher, formerly vice-president in charge of operations at Pontiac, also goes to Flint. Mr. Christopher's work at Pontiac is taken over by Mr. Tanner.

## Industry Begins Drive to Link Open Market

NEW YORK, March 30—The whole automotive industry is launching a business "barrage" on Saturday, April 2, according to an announcement made by Alfred Reeves, vice-president, of the National Automobile Chamber of Commerce.

General Motors is opening shows in 55 cities, Chrysler Corp. is announcing the new Plymouth, and special programs in newspaper advertising, radio and other advertising media are being staged by Packard, Hudson, Nash, Auburn, Graham-Paige, Hupmobile, Reo and others.

Studebaker Corp. has designated the week as "Call of the Open Road Week" and adopted the slogan "A New Car is a Badge of Honor."

With the announcement of the new Ford, the whole industry is practically in line with the inauguration of a vigorous sales campaign beginning this week.

## Schraders Offer New Gage

NEW YORK, March 30—A. Schrader's Son, Inc., Brooklyn, has designed a new low pressure tire gage for testing the new low pressure tires recently introduced. This new gage, built on the same principle as other Schrader gages, is calibrated from 5 to 25 lb. in one-pound units.

## Curtiss-Wright Reports Loss

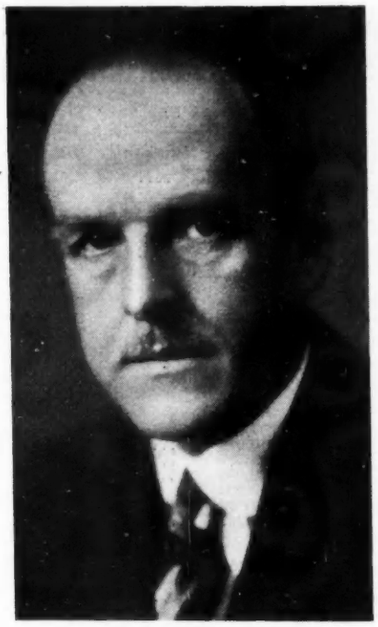
NEW YORK, March 30—Curtiss-Wright Corp. reports net operating loss for 1931 of $1,976,040. In addition to this, extraordinary reductions have been taken totaling $2,270,083, resulting in a total loss for the year of $4,246,123.

## B. O. P. Appointments

DETROIT, March 31—Additional appointments announced by Mr. Grant for the Buick-Olds-Pontiac Sales Co. include the following: J. T. Collings, formerly general sales manager, Oldsmobile, is director of retail stores; D. P. Brother is director of advertising. Sales promotion managers are E. J. Poag, Buick; W. C. Herringss, Olds, and W. R. Huber for Pontiac. J. E. Grimm, Jr., is advertising manager for Buick, succeeding Poag. Dealer business-management comes under W. T. Whalen, formerly assistant general sales manager, Olds. W. I. Gibson, formerly with Chevrolet and Pontiac, is manager of schedules and car distribution. R. F. Schreitmueller, formerly wits sales section of General Motors, is manager of organization and dealer analysis departments.

## Warner Aircraft Loss

DETROIT, March 29—Warner Aircraft Corp., Detroit, has reported a net loss of $93,118 for year ended Dec. 31, 1931, against a net loss during 1930 of $129,194.



E. P. Blanchard

## Bullard Elects Blanchard

At the annual stockholders meeting of the Bullard Co. held at Bridgeport, Conn., on March 16, E. P. Blanchard was elected to the board of directors.

Mr. Blanchard has been connected with Bullard for 12 years during which time he has held the positions of advertising manager and sales manager.

## Herman M. Kinnee

BUFFALO, March 28—Herman M. Kinnee, 46, president of the Buffalo Cadillac Corp., died suddenly on March 25. He had been ill two weeks.

In addition to being president of the Cadillac firm in this city, Mr. Kinnee was a director of the Baltimore Cadillac Corp., president of the National Refrigeration Corp., Buffalo, and a director of the Keystone Printing Co., Detroit.

He entered the employ of the Cadillac company immediately after his graduation from the public schools in Detroit. At the age of 38 he came to Buffalo to take an executive position with the Buffalo branch, and was promoted rapidly until in 1920 he was elected president of the firm.

## De Vaux Staff Named

R. H. Mulch, general sales manager, Continental-DeVaux Company has announced the following appointments: George R. Morris, assistant sales manager in charge of Western territory; F. F. Stowers, assistant sales manager in charge of Eastern territory, and O. E. Brown, sales development manager.

Stowers and Morris have been identified with DeVaux sales since production of the first DeVaux in April, 1931. O. E. Brown recently joined the DeVaux organization prior to which he was connected for eleven years with Packard Motor Car Company in various sales activities. During a period of this time he was Eastern district sales manager with headquarters in Detroit, and for four years was head of the Rochester, N. Y. Packard distributing organization.

H. E. Smith has been placed in charge of car distribution and H. J. Hudson has been named by Mulch as DeVaux service manager.

F. E. Kennedy, who was regional sales manager of Atlantic Coast States, has rejoined the Continental-DeVaux organization and will be in charge of Middle Atlantic States territory.

E. S. Jones and O. A. Ohland will serve as assistants to Morris, Ohland with headquarters in Kansas City and Jones supervising Pacific Coast DeVaux sales.

## A. O. Smith Denies Merger With U. S. Steel

MILWAUKEE, March 29—Unqualified, positive denial was made today by the A. O. Smith Corp. concerning rumors that negotiations are in progress for a merger with or sale to the United States Steel Corp. The rumors, denied many months ago following a visit to the Smith Corp. by Myron C. Taylor, now chairman of the Steel Corp., were repeated following the arrival of three U. S. Steel representatives for a series of conferences with the Smith organization. These representatives are John Hulst, of the engineering department, and W. A. Forbes and E. C. Baines, research department. The denial said that it is only natural that the Smith Corp., as the largest purchaser of steel in the United States, should have the cooperation of the Steel Corp. in its requirements and specifications and any changes that might be under consideration. Normally the Smith Corp. buys 100,000 tons of steel a month, and a large share of this supply is purchased from U. S. Steel mills.

## Samuel M. Curwen

PHILADELPHIA, March 30—Samuel M. Curwen, president of the J. G. Brill Co. and a director of the American Car & Foundry Motors Corp., died yesterday at his Haverford, Pa., home in his seventy-third year. Mr. Curwen was a friend of the late Thomas A. Edison and had contributed many patents to the development of railway cars.

## Allied Products Reports Loss

DETROIT, March 22—Allied Products Corp. and subsidiaries have reported net loss of $95,157 after all charges, including depreciation, for year ended Dec. 31, 1931, compared with a net loss of $138,728 for the previous year.

# Exports, Imports and Reimports of the Automotive Industry For February and Two Months Ended February, 1932-1931

| | Month of February | | | | Two Months Ended February | | | |
|---|---|---|---|---|---|---|---|---|
| | 1932 | | 1931 | | 1932 | | 1931 | |
| | Number | Value | Number | Value | Number | Value | Number | Value |
| Automobiles, parts and accessories | .... | $7,432,873 | .... | $16,071,378 | .... | $14,197,397 | .... | $30,426,133 |
| Motor trucks and buses except electric (total) | 2,113 | 934,849 | 4,187 | 2,468,655 | 4,628 | 2,076,146 | 8,721 | 4,836,101 |
| Under one ton | 344 | 87,293 | 833 | 326,100 | 691 | 176,884 | 1,407 | 522,358 |
| One and up to 1½ tons | 1,561 | 580,848 | 2,720 | 1,347,579 | 3,553 | 1,377,959 | 5,566 | 2,661,556 |
| Over 1½ tons to 2½ tons | 133 | 108,869 | 399 | 368,549 | 246 | 237,666 | 1,362 | 1,002,222 |
| Over 2½ tons | 44 | 99,633 | 203 | 413,385 | 91 | 192,182 | 306 | 610,999 |
| **PASSENGER CARS** | | | | | | | | |
| Passenger cars except electric | 4,930 | 2,661,618 | 9,187 | 5,820,322 | 9,404 | 5,089,084 | 17,493 | 10,704,238 |
| Low price range, $850 inclusive | 4,191 | 1,855,070 | 7,160 | 3,471,857 | 8,068 | 3,627,274 | 13,747 | 6,396,951 |
| Medium price range, over $850 to $1,200 | 522 | 508,303 | 1,317 | 1,291,948 | 927 | 894,245 | 2,342 | 2,264,604 |
| $1,200 to $2,000 | 122 | 166,301 | 325 | 475,650 | 197 | 268,445 | 572 | 854,183 |
| Over $2,000 | 44 | 110,447 | 206 | 508,490 | 100 | 254,116 | 413 | 1,005,101 |
| **PARTS, ETC.** | | | | | | | | |
| Parts, except engines and tires | | | | | | | | |
| Automobile unit assemblies | .... | 2,205,936 | .... | 4,984,234 | .... | 3,685,487 | .... | 9,039,885 |
| Automobile parts for replacement (n.e.s.) | .... | 1,010,998 | .... | 2,216,659 | .... | 2,088,310 | .... | 4,730,543 |
| Automobile accessories | .... | 195,286 | .... | 306,878 | .... | 359,636 | .... | 611,771 |
| Automobile service appliances (n.e.s.) | .... | 189,042 | .... | 337,253 | .... | 303,441 | .... | 582,445 |
| Trailers | 18 | 12,900 | 28 | 22,418 | 30 | 19,341 | 66 | 43,305 |
| Airplanes, seaplanes and other aircraft | 12 | 48,150 | 7 | 68,768 | 20 | 165,003 | 19 | 271,621 |
| Parts of airplanes, except engines and tires | .... | 99,327 | .... | 154,205 | .... | 158,460 | .... | 360,052 |
| **BICYCLES, ETC.** | | | | | | | | |
| Bicycles | 97 | 2,159 | 236 | 6,299 | 302 | 7,265 | 437 | 11,663 |
| Motorcycles | 281 | 62,424 | 471 | 113,115 | 489 | 111,987 | 799 | 192,418 |
| Parts and accessories, except tires | .... | 34,802 | .... | 57,261 | .... | 52,516 | .... | 101,907 |
| **INTERNAL COMBUSTION ENGINES** | | | | | | | | |
| Stationary and Portable | | | | | | | | |
| Diesel and Semi-Diesel | 5 | 21,575 | 21 | 29,005 | 9 | 58,878 | 54 | 49,705 |
| Other stationary and portable: | | | | | | | | |
| Not over 10 hp. | 254 | 15,827 | 800 | 67,941 | 557 | 37,959 | 1,658 | 132,594 |
| Over 10 hp. | 64 | 22,642 | 238 | 137,213 | 105 | 89,474 | 454 | 279,879 |
| Automobile engines for: | | | | | | | | |
| Motor trucks and buses | 267 | 49,885 | 578 | 74,502 | 558 | 86,227 | 1,219 | 159,982 |
| Passenger cars | 1,366 | 146,645 | 2,031 | 162,370 | 2,672 | 267,779 | 3,068 | 254,420 |
| Tractors | 1 | 15 | .... | .... | 5 | 1,426 | 2 | 1,007 |
| Aircraft | 10 | 20,161 | 15 | 74,676 | 24 | 38,839 | 30 | 186,803 |
| Accessories and parts (carburetors) | .... | 116,410 | .... | 203,219 | .... | 231,448 | .... | 383,785 |
| **IMPORTS** | | | | | | | | |
| Automobile chassis (dutiable) | 32 | 22,929 | 34 | 36,805 | 66 | 64,208 | 74 | 52,279 |
| Other vehicles and parts for them (dutiable) | .... | 1,114 | .... | 3,234 | .... | 2,985 | .... | 6,041 |
| **REIMPORTS** | | | | | | | | |
| Automobiles (free from duty) | 6 | 4,850 | 12 | 10,120 | 12 | 10,612 | 33 | 44,707 |

## British Manufacturer Buying Canadian Wood

TORONTO, March 29—An initial order for 12 carloads of hardwood from Nova Scotia and New Brunswick has been secured for an English motor car manufacturing company, R. W. E. Burnaby, maritime trade commissioner in Toronto, has announced. The representative of a local hardwood company, by which the order was obtained, has left to take up options on this lumber from operators in the two maritime provinces. The consignment will be assembled at the Eastern Car Works, Trenton, N. S., and shipped from Halifax April 16. Should the trial shipment prove satisfactory, the commissioner believes a large new permanent market for maritime hardwoods will be established. The order is the result of negotiations extending over the last 12 months.

## Resco Distributors Formed

NEW YORK, March 28—Resco Distributing Company has been organized to distribute a new type of reflector for automobile headlights. This reflector, which is manufactured by the Trulite Electric Mfg. Co., Hoboken, New Jersey, attaches directly to the headlight bulb, with a reflector beneath, and immediately in front of the source of light, cutting off the direct beams from the line of vision.

In this way, the reflector cuts off the glare due to direct beam and emits only reflected light from which it is claimed a higher degree of efficiency is obtainable. The company has a production of 20,000 pairs of reflectors a month.

## Utility Supply Gets Order

CLINTONVILLE, WIS., March 28—The Utility Supply Co., subsidiary of the Four Wheel Drive Auto Co., has received a contract from the Western Electric Co. to supply all needs of various types of derricks for motor trucks in the construction division of the Bell Telephone Co., it is announced. The Bell system at present uses about 10,000 trucks in this division.

## Ford Agents Arrive in U. S.

NEW YORK, March 29—A group of foreign agents of the Ford Motor Co. arrived recently aboard the Europa to visit, among other places, the company's plant at Dearborn, Mich. This group consists of Theodore Tenley, Carl Tittes, Paul Cappel, Emilio Ara with Mrs. Ara, Manuel Lay and Mrs. Lay, Tiovo William Billfors, Erik Siltberg and Ingvo Swenson.

## Cuban Duties on Autombiles Increased

WASHINGTON, March 28—Effective March 17, a Cuban presidential decree increases rates of duty on automobiles, trucks and motorcycles and reduces duties on automobile and truck chassis and tractors, according to air mail reports received by the Department of Commerce from Trade Commissioner Howard H. Tewksbury, Havana. The new and old ad valorem rates, the latter shown in parentheses, follow:

Complete automobiles, with bodies of any material, 24 per cent (20); complete trucks, with bodies of wood or of wood and metal, 24 (12); the same, with bodies of steel or other metal, 16 (12); automobile chassis, without chassis (old rate not shown); truck chassis, without body, 9.6 (12); parts and accessories for automobiles and trucks, 12 (20 for automobiles and 12 for trucks); tractors, 4 (8); parts for tractors, 4 (8); motorcycles and similar articles and parts and accessories, 24 (20); velocipedes, bicycles and parts and accessories, unchanged at 12 per cent.

Complete automobiles with bodies of any material, when the value exceeds $400, and velocipedes, bicycles and parts and accessories are subject to the general surtax of 10 per cent and other items listed are subject to a surtax of 3 per cent.

# Henry M. Leland Dies in Detroit; Pioneered Two Cars

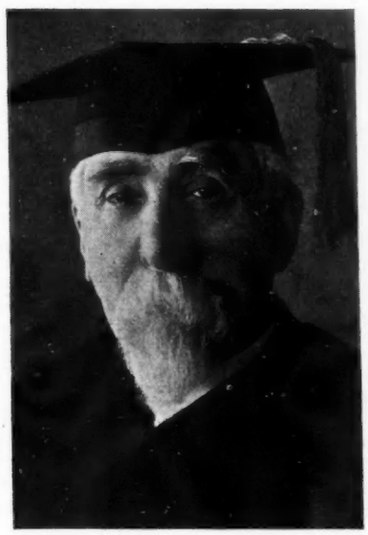
**Founder of Cadillac Motor Car Co. and Lincoln Motor Co., was past-president of the Society of Automotive Engineers. Began automotive career late in life and was active until few years ago**

Henry M. Leland, a pioneer of the American automobile industry, founder of the Cadillac Motor Car Co. and the Lincoln Motor Co., and past president of the Society of Automotive Engineers, died in Grace Hospital, Detroit, on Saturday morning last (March 26) after a month's illness. Born at Danville, Vt., on Feb. 16, 1843, he was in his ninetieth year at the time of his death.

Mr. Leland received his education in the public schools of New England and gained his first experience in mechanical work in the Compton Loom Works in Worcester, Mass., and in the U. S. Arsenal in that city, where he was engaged in the manufacture of rifles for the Union Army during the time of the Civil War. After working for a considerable period for the Brown & Sharpe Mfg. Co., Providence, R. I., he decided to make himself independent and, following the classical advice of Horace Greeley, went West. He settled in Detroit in the early eighties and established a plant for the manufacture of shop machinery and precision tools. Shortly after he associated himself with Robert C. Faulconer, another man from the Brown & Sharpe plant, and the firm became known as the Leland & Faulconer Mfg. Co. During the eighties the business expanded rapidly, but a severe set-back was suffered following the panic of 1892, from which the firm did not fully recover for several years.

The company then engaged in the manufacture of engines for naphtha launches. It was shortly after this that experimental work in connection with the development of gasoline automobiles began. One of the local pioneers in this field was Ransom E. Olds, who organized the Olds Motor Works and built a factory of considerable size on Jefferson Avenue. The Olds Motor Works produced the Oldsmobile runabout, the first small, low-priced gasoline automobile built in this country to achieve a considerable degree of popularity. The car had a planetary transmission which gave some trouble in the early stages by reason of its noisy operation. A sample transmission in which this difficulty was overcome was built at the Leland & Faulconer plant, and as a result this company secured an order for 5000 of the transmissions, that being the number of Oldsmobiles sold the following year. In 1901 a large part of the Olds plant was destroyed by fire, and to prevent excessive delays in deliveries to customers, a contract for the manufacture of the engines for the runabouts was then also given to the Leland & Faulconer Mfg. Co.

Having been thus thrown into contact with the budding automobile industry, it is not surprising that the executives of the Leland & Faulconer company looked around for chances to enter the industry themselves. Mr. Leland often met the principals in a recently organized firm, the Detroit Automobile Co., whose engineer, Henry Ford, was developing a two-cylinder horizontal automobile engine in a shop at the old C. R. Wilson carriage plant on Cass Avenue. They had approached Leland with a proposition to manufacture an automobile employing this Ford engine, and Leland finally joined them.



**Henry M. Leland**

Mr. Leland is here shown in cap and gown, which he donned when the degree of Doctor of Engineering was conferred upon him by the University of Michigan in 1920

At the same time that Ford was working on his two-cylinder engine, another engineer, Alonson P. Brush, was developing a single-cylinder engine with applied copper water jacket and various special features of control at the Leland & Faulconer plant. Leland preferred this single-cylinder to the Ford double-cylinder engine, and as a result Henry Ford in 1901 resigned from the Detroit Automobile Co., which some time later was reorganized as the Cadillac Automobile Co. Lem W. Bowen, one of the original Ford backers, became president of the new company, and the manufacture of the single-cylinder Cadillac runabout was begun. This car was first exhibited publicly at the New York automobile show in the fall of 1902. The engines for it were built by the Leland & Faulconer Mfg. Co. and contracts for sufficient parts for 3000 cars were placed, that being the number sold during the first year.

Two years after its organization Henry M. Leland assumed the presidency of the Cadillac Automobile Co. In the meantime the company had encountered some rough going. A fire had destroyed a considerable portion of its factory as well as a large number of completed cars, but under Mr. Leland's direction operations were continued in the unaffected portion of the plant and rebuilding operations were immediately begun.

In 1908, through the initiative of William C. Durant, a nucleus for the General Motors Corp. was created by merging the Cadillac Automobile Co. with the Buick Motor Co. Mr. Leland remained at the head of the Cadillac Motor Division of General Motors Corp. until 1917, while his son, Wilfred C. Leland, acted as vice-president and general manager.

In 1914 Mr. Leland served as president of the Society of Automobile Engineers and he came east to open the summer meeting which was held at Cape May, N. J., that year. However, owing to sickness in his family he was compelled to leave immediately after the business session had been held. Mrs. Leland died that year.

In 1917 the Lelands resigned from the Cadillac company and organized the Lincoln Motor Co. to engage in war work for the government. A large factory was erected in Detroit, and a contract for the manufacture of Liberty aircraft engines was obtained. It was later stated that the factory with its equipment required an investment of approximately $8,000,000, and the claim has been made that before the war ended the plant turned out more aircraft engines than any other in the world.

After the armistice the Lincoln Motor Co. developed a high-grade passenger car equipped with an eight-cylinder V-engine, which it prepared to turn out in large numbers. Formal announcement of the car was made toward the end of 1920, practically coincident with the collapse of the post-war boom. To finance the development of the new model and install equipment for its production, an issue of $6,000,000 of preferred stock had been sold to the public. With the demand for cars, and especially for those in the higher price classes declining rapidly, the company soon found itself involved financially, its difficulties being added to by the bringing of a suit for unpaid excess profit taxes to the

amount of several million dollars by the Federal Government.

The outcome was that the company was placed into Federal receivership, and at a receiver's sale in February, 1922, it was bought by Henry Ford. At first the Lincoln Motor Co. was continued as a separate enterprise, independent of the Ford Motor Co., and the two Lelands remained in charge. But after a few months, disagreements arose between the Fords and the Lelands. From a statement issued by Ford counsel it appeared that production did not proceed sufficiently rapidly at the Lincoln plant to suit the Fords. At the time the business was taken over production was being carried on at the rate of about 15 cars per day, and by the middle of summer this had been accelerated to 30 per day, but business had so much picked up by this time that a good many more could be sold. To speed up production, certain operations were transferred to the Ford plants at Highland Park and River Rouge, but this did not suit the Lelands. It was stated at the time that when prices were set on the car a considerably larger production was figured on, and with the reduced production the operations were unprofitable. As a result of these disagreements the Lelands in June, 1922, resigned from the Lincoln Motor Co.

At the time of the sale, Henry Ford had paid to the Lelands the full amount of their investment in the Lincoln company and when they resigned from the company it was rumored that he would pay them $250,000 more each in consideration of the cancellation of their contracts.

Later on a dispute arose regarding the settlement. In March, 1923, Ford counsel announced that Henry Ford of his own volition had paid in full the losses sustained by creditors of the Lincoln Motor Co. due to the fact that the net returns from the sale of the company amounted to only 52.5 per cent of the claims, and also the losses of directors who had indorsed notes of the company, the losses thus made good amounting to approximately $4,000,000. The Lelands, however, claimed that Ford, previous to the sale, had promised them verbally that he would reimburse not only the creditors but also the stockholders for their losses, and they brought suit, but lost their case. Since his resignation from the Lincoln Motor Co. Mr. Leland had been living in retirement.

Henry M. Leland learned the machinist trade and he was no doubt a skilled craftsman and a lover of fine mechanical work. It was he who introduced the system of interchangeable manufacturing in automobile production, and this achievement was recognized by the award of the Dewar trophy by the Royal Automobile Club of Great Britain in 1908 for a unique demonstration of interchangeability on three Cadillac cars. These cars were taken from the sales floor of the London Cadillac representative and driven 50 miles each to and on Brooklands race track. The cars were then completely taken apart by two mechanics, the parts intermingled, and three cars were assembled from the pile of parts and then driven away, no other tools except screw drivers, wrenches and pliers being used in the assembling operation.

It was also no doubt due to the high-grade workmanship on which Mr. Leland insisted that the Cadillac company was able to sell single-cylinder cars after practically all its competitors had gone to the two-cylinder type, and then, in order to avoid being a tail-ender in the progress of automobile engineering practice, it jumped from the single-cylinder to the four-cylinder. Later on its four-cylinder Model 30 achieved such a degree of popularity that it continued to find a market for years after practically all other makers in the same price class had adopted the six-cylinder engine, and Cadillac then, in 1914, made another big jump ahead in cylinder multiplication and brought out the first American passenger car with V-eight engine.

Mr. Leland is survived by a son, Wilfred C. Leland, who was associated with him in business throughout the period he was connected with the automotive industry, and one daughter.—P.M.H.

## Kelsey-Hayes Reports Loss

DETROIT, March 28—Kelsey-Hayes Wheel Corp. and subsidiaries has reported net loss of $667,228 after all charges, for year ended Dec. 31, 1931, compared with net profit of $2,262,222 in 1930.

Current assets as of Dec. 31, 1931, were $5,233,987, including cash of $632,314, and current liabilities were $11,173,139, compared with current assets of $6,618,037 and current liabilities of $9,480,052 in the previous year.

# February Shows Advertising Gain

### March Figure in National Media Slightly Below '31

NEW YORK, March 29—Advertsing by the automotive industry in national magazines during March amounted to $1,382,128, only 0.9 per cent below the total of $1,394,070 for March a year ago, while expenditures for radio broadcast advertising over national networks during February, the figures for which have just become available, jumped 134.4 per cent from $98,355 to $230,607. Of the expenditure in national magazines, $1,052,780, or 76.2 per cent, went for passenger cars and trucks; $86,830, or 6.3 per cent, went for tires and tubes; and 242,518, or 17.5 per cent, went for accessories, according to figures compiled from National Advertising Records by the business survey department of Dorrance, Sullivan & Co. National farm magazines fell to $148,780 in March, 21.9 per cent under the $190,590 registered for this classification in March, 1931.

For the first quarter of the year the total in national and farm magazines was $4,093,640, a drop of 11.0 per cent from $4,600,397 spent during the corresponding period a year ago. National magazines accounted for $3,841,400 of this total, off 8.1 per cent, and national farm magazines accounted for $252,240, off 40.2 per per cent.

The gain in radio served to bring the total for all three classifications to $2,080,735 in February, a gain of 2.9 per cent over last year, but for the first two months the figure was $3,125,606, a drop of 3.8 per cent.

## + + CALENDAR OF COMING EVENTS + +

### SHOWS

National Aircraft, Detroit, Mich..Apr. 2-10

### FOREIGN SHOWS

Tel Aviv, Palestine (Levant Fair) .....April 7-30
Milan, International Automobile Salon .....April 12-27
Zagreb, Jugoslavia, Automobile Salon .....April 23-May 2
Peznan, Poland, International Fair .....May 1- 8
Dublin, Commercial .....May 4- 7
Budapest, International Fair...May 7-16
Belfast, Commercial .....May 25-28
Bordeaux, Fair .....June
Cork, Commercial .....June
Inverness, Commercial .....June 21-24
Southampton, Commercial .....July 5- 9
Llandrindod, Wales, Commercial .....July 20-22
London, Olympia Show .....Oct. 13-22
Glasgow, Scottish Motor Show..Nov. 11-19

### CONVENTIONS

Society of Automotive Engineers (Aeronautic Meeting), Detroit.April 5-6
American Welding Society, Annual Meeting, New York City.....Apr. 27-29
American Society Mechanical Engineering (Management Div.) Philadelphia .....May 2-6
American Gear Manufacturers Asso., Sixteenth Annual Meeting, Cleveland .....May 12-13
U. S. Chamber of Commerce, San Francisco, Calif.....May 16-20
National Battery Mfrs. Asso., Chicago, Ill. .....May 19-20
American Society Mec. Eng. (Natl. Aeronautic Meeting) Buffalo..June 6-8
American Society Mec. Eng. (Natl. Oil & Gas Meeting) State College, Pa. .....June 8-11
National Safety Council, Washington, D. C. .....Oct. 3-7

# So beautiful that 50 people stopped to ask about it on one trip

"A FEW months ago I took delivery of a Pierce-Arrow car in Buffalo and drove it out to San Francisco," writes Chester N. Weaver, California distributor of Studebaker and Pierce-Arrow. "The car was equipped with your stainless steel wheels and on this trip I have had to explain the wheels to interested people at least fifty times. To me the wheels seemed to be quite an advertisement and we are pushing them here in San Francisco."

• • •

If the beauty of this steel artillery wheel stops passers-by—if it arouses their interest and curiosity—think how much of an impetus it adds to the sale of the automobile equipped with it.

Study the Budd-Michelin Steel Artillery Wheel. Note its rich beauty—its character. Mark its sleek, clean appearance—and the absence of pockets to avoid collecting dirt, water and mud.

All-steel from rim to rim, it is the strongest automobile wheel ever made. It is made in both low-carbon steel, and in stainless steel.

In low-carbon steel it can be given a natural wood finish—or can be finished in lacquer the same as the body. In stainless steel it will harmonize and enrich any color scheme of the body.

This wheel is now on display at the Budd plants in Detroit and Philadelphia. We would like to show it to you and tell you more about it.

BUDD WHEEL COMPANY

Detroit · Makers of BUDD-MICHELIN WHEELS · Philadelphia

# ★WHEELS BY BUDD★

# Ford's 65 hp. V-Eight Announced

*(Continued from page 515)*

Pressed for an explanation of this omission, the chassis lecturer said that he had no official word on the subject but, in his opinion, it was a measure of safety because of the speed capabilities of the car, which he said, exceeded the 80 miles figure on the speedometer.

Traverse springs are used both front and rear with insulated shackles of the ferrule and rubber bushing type. The front spring is similar to the Model "A," but the rear spring is placed rear of the axle housing, instead of directly above it, as in Model "A" design. The spring enters the open bottom of a cross member, and is lower than before, the ends being shackled to perches on the axle housing instead of above it.

Rear axle is similar in design to Model "A" except that the drive shaft is tubular. The ratio is 4.33 to 1, as compared to 3.77 to 1 on the Model "A." Frame side rails 6 in. deep at maximum point have tapered top flanges 2 in. wide near the center, all of stock approximately 3/32 in. thick. The lower flange is formed with a reverse bend at the lower corner of the rail. The frame incorporates a double drop and is also formed to match body contours. This construction provides a low center of gravity. There are five cross members, but casual observers will count four. The odd member is a large V-shaped assembly at the rear of the frame which performs the incidental function of carrying the spare tire. Other cross members are at the rear spring, at rear of transmission (forming third engine support) one at the front of the engine and a straight tubular member at the front of the frame. Frame side rails are exposed between body and running boards, without conventional splash pans.

## Shock Absorbers with Thermostatic Control

Two new features have been incorporated in the Houdaille hydraulic double-acting shock absorbers, one a thermostat control which compensates for varying temperature conditions, and the other an ingenious valve which automatically adjusts the shock-absorbing action to suit road conditions.

Brakes are of double-shoe type somewhat like the Model "A," but with changes in detail. Drums are of cast iron with an external rib, and braking surface measures 12 in. in diameter and 1½ in. in width. Total brake lining surface is 186 sq. in. Both pedal and hand lever operate four brakes instead of six, as in the preceding model. The brake cross shaft does not extend to frame side rails, but is about 6 in. long and is attached to the rear of the cross member which carries the engine. Brake rods extend on an angle from arms on this shaft to brake camshaft arms.

Brake and clutch pedals are not attached to the engine but are carried on brackets on the center cross member.

Instruments are compactly arranged in the center of instrument board. There are three dials, the left being the ammeter, the center dial an 80-mile speedometer with clock hand, and on the right is the hydrostatic gasoline gage. Throttle control is by button at left of the ammeter, the choke button below the speedometer and the dash light button is placed near the gasoline gage.

Steering gear is locked for parking by a co-incidental lock on the ignition. Switch and lock are placed forward and above the steering post just to the rear of the instrument board. It is impossible to lock the steering wheel with the ignition on.

Wheels are 18 in. in diameter. The large hubs inclose the bolts which attach the wheel to the drum. There are 32 steel spokes, sharply pitched and electrically welded to the drop-center rim and hub shell, forming an unusually strong unit. Tires are 5.25 x 18 in. compared with 4.75 x 19 on the Model "A."

The four-cylinder engine bears a strong resemblance to the Model "A." It has, however, been modified by three-point rubber suspension as on the V-8. The gasoline pump is carried on the right side of the engine just forward of the carburetor. External details appear to be the same as on the Model "A." Cylinder sizes are the same.

New commercial cars and trucks are powered by the new four-cylinder engine. The most noticeable change is the omission of the gasoline tank from the cowl assembly. The tanks on the trucks now being placed **under seats.**

Rear springs of truck chassis have been changed from cantilevers to long semi-elliptics which provide support at a point much further back on the frame side rails than in the model "AA" trucks.

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# Service Function of Pistons is Used As Basis for Testing and Inspecting

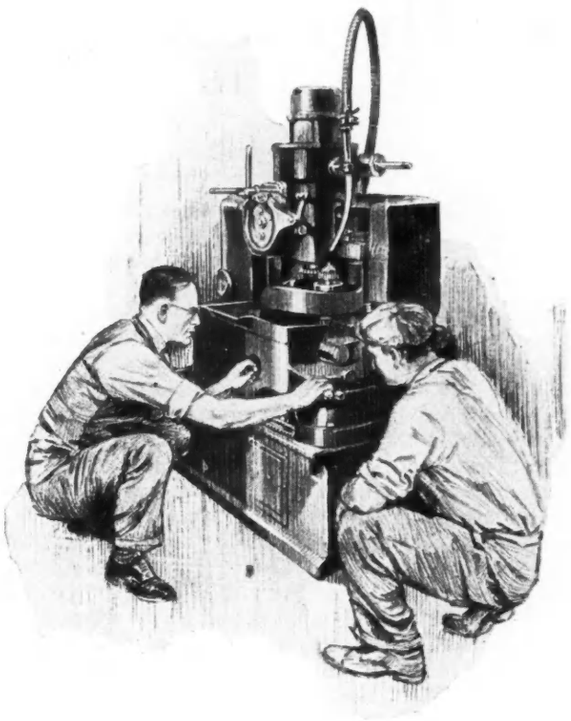
*(Continued from page 526)*

quite some time, or thinning down of the oil with fuel, in imitation of the conditions obtaining in practice. As a standard of comparison the aluminum-copper alloy Bohnalite was chosen, and its rate of wear was made equal to 1.

Measurements are made on the worn surfaces. The wear-measuring machine is suitable for tests on gray iron, light alloy on gray iron, steel on gray iron; in short, for tests on all possible materials of construction. As a matter of fact, the results obtained with this machine on many cylinder and piston materials have been shown to agree well with the results of practice. In investigating new piston materials it is therefore permissible to be guided tentatively by the results of tests made in this machine, before proceding to the expensive tests in the engine.

(Part two of this survey will appear next week in *Automotive Industries*—EDITOR.)

# Service That Recognizes Unqualified Responsibility



FELLOWS SERVICE
Includes:
A Complete Line of Gear Cutting and Inspection Equipment and Tools, Coupled With Expert Engineering Assistance

## . . . For Gear Shaper Performance
## . . . For Gear Satisfaction Through
### ORIGINAL FELLOWS CUTTERS

SERVICE, as the Fellows Organization renders it, is a major contribution to production economy in shops which utilize Fellows Products. High accuracy production of high-speed gears—whether spur or helical, external or internal—is as much a matter of engineering as of manufacture.

In actual practice, Fellows Service renders its most important assistance in working out the practical production of gear designs which will operate successfully. Frequently special cutters are necessary, which require a thorough understanding of gear design, as well as an intimate knowledge of Gear Shaper possibilities.

As manufacturers of Gear Shapers and cutters used on them, it is evident that we are well qualified to render a complete service. Furthermore, we "stay with the job" until it is acceptable.

As one satisfied customer so aptly states: "Your Service Engineer asked to look over our new design. We gave him *carte blanche* and today we are reaping the benefit. We are turning out a transmission which five years ago would have been considered impossible."

Before you tool up for any new gear production job — or for cutting cams, ratchets, splines, etc.—consult Fellows. There is no obligation, and you may profit greatly. Write: THE FELLOWS GEAR SHAPER COMPANY, 78 River Street, Springfield, Vermont, or 616 Fisher Building, Detroit, Michigan.

FELLOWS
GEAR SHAPERS

# Chromium Plating on Zinc Alloys Should Have 0.0003 in. Thickness

*(Continued from page 529)*

mand an uneconomical excess thickness. In the final analysis, the selection should be made on the basis of service tests.

Too often in the past the salt spray test or some similar accelerated test has been used, with complete disregard for outdoor service tests, to define the thickness of a new type of coating on an old base or a familiar coating on a new base. This is a dangerous procedure, since there is no law of nature which prescribes that the resistance of a plated coating to the action of a sodium or calcium chloride mist shall parallel the resistance to normal weathering.

The writers have been engaged in corrosion studies for a number of years, and have obtained definite indications that the resistance of metals and plated coatings to atmospheric corrosion is best determined by exposure to the atmosphere. It is true that in many instances the automotive engineer does not have sufficient time in which to carry out the tests involved. For this reason the writers venture to offer the results of their own experience in such tests on plated zinc to serve as a guide for the engineer to whom the problem may be new.

A very large percentage of the corrosion of plated parts on an automobile takes place when the car is left outdoors overnight. With normal care and adequate housing in garages, which the producer has a right to expect for his product, this abnormally high corrosion rate is avoided.

It is evident that the exposure of plated specimens on a 24-hour basis will not furnish an accurate picture of the corrosion of plated parts on the average automobile. Only the careful correlation of such exposures with service life in actual use will permit the extrapolation of 24-hour data to service life.

Numerous tests of both types have been conducted. Continuous exposures are made on the laboratory roof at Palmerton, Pa., while service tests are made on personal cars as well as on service cars used by the New Jersey Zinc Co. In all of these tests the same conclusion is evident; namely, that four to five weeks of continuous exposure will produce a condition which requires at least two years of average car service to duplicate. As a matter of fact, the service obtained from the company cars is rather more severe than average, in that the cars normally are in use from 6.30 a. m. to 9 p. m. with an average annual mileage of 20,000 miles.

On the basis of tests carried out over a period of three or four years, it has become evident that coatings 0.0003 in. or greater in thickness will give satisfactory automotive service, while coatings even a little thinner will fail in a relatively short time. It would seem from the data that the curve of corrosion rate against thickness of coating takes a sharp break at 0.0003 in., with a tendency to flatten out again above this point.

In illustration of this effect, the low magnification photographs reproduced show the condition of nickel-chromium coatings of graduated thickness exposed outdoors for a period equivalent to two years of ordinary service on an automobile. Corrosion is apparent as white areas against the black background of total reflection. It will be seen that corrosion is present on all thicknesses up to 0.0003 in., at and above which the coatings are in perfect condition.

It should not be implied from these photographs that a 0.0003 in. coating will resist corrosion indefinitely. That is not true for this thickness of coating on zinc or on any other metal. What may be implied is that coatings of this thickness show a distinct advantage over coatings only slightly thinner, and the advantage is sufficient to be represented in consumer satisfaction in the life of the plated parts of the car.

It is our belief, based on these and many other tests, that a specification calling for a nominal thickness of 0.0003 in. of nickel, with a minimum thickness at any point of 0.00025 in., will go far toward removing poor plating jobs on zinc from the market. Any casting that is so complicated in shape that a nominal 0.0003 in. coating will not give sufficient thickness in the recesses should be redesigned under the supervision of a competent plater, or the use of auxiliary anodes will be required.

No attempt will be made here to define a standard specification and rule of inspection. Each individual consumer has ideas on the general subject which, with a little thought, can be made applicable to this problem. The number of pieces to be tested and the method of testing are best selected by the purchaser himself.

It may be pointed out, however, that three positive methods of measuring thickness are available. Special micrometers may be obtained with which to measure the coating after the zinc backing has been removed with acid. Measured samples may be dissolved in acid and a rapid nickel determination made, from which the average thickness may be calculated. Lastly, a microspecimen may be measured at high magnification with a micrometer eyepiece. All three methods have been used and agree closely in their results.

The extra cost of producing satisfactory plated coatings on zinc will not reduce or eliminate the price differential between zinc and the other common metals, since the other metals also suffer from inferior plating and require additional plating cost to insure a suitable coating.

In conclusion, the main points may well be reiterated:

1. Zinc is the least expensive non-ferrous metal.
2. Zinc alloys of adequate strength and permanence are available.
3. Zinc can be successfully plated with nickel and chromium.
4. Zinc requires a minimum thickness of 0.0003 in. of nickel coating for adequate service life.